TECHNOLOGY DEPT.

MAY, 1952

Telephone and Management Engineer

PUBLIC LIBRARY
MAY 26 1952
DETROIT

THE NATIONAL TELEPHONE MAGAZINE

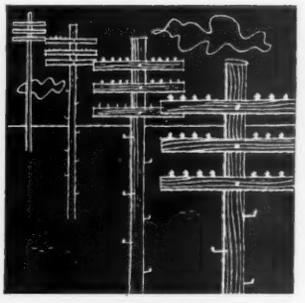
Featuring In This Issue—

- **New Construction Methods, *by John S. Reed***
- **Measuring The Coupling Between Contigous Telephone Circuits, *by Jefferson Clark Davis***
- **Washington Bureau Reports *by Roland Davies and Fred Henck***

1852
1862
1872
1882
1892
1902
1912
1922
1932
1942
1952

Of all wood preservatives

only Coal-tar Creosote has stood the test of TIME



For more than 100 years, under the most severe and exacting conditions, Coal-tar Creosote—and ONLY Coal-tar Creosote—has been proved successful. In cold, hot, damp and dry climates . . . in salt water and fresh water . . . Coal-tar Creosote gives maximum wood protection at minimum cost.

Be sure it's Barrett* Coal-Tar Creosote

Barrett*

THE BARRETT DIVISION
ALLIED CHEMICAL & DYE CORPORATION
40 RECTOR STREET, NEW YORK 6, N. Y.

*Reg. U. S. Pat. Off.

Main telephone building Carlisle Exchange.

Exide-Manchex 11-FME-17 Battery in Carlisle Exchange of United Telephone Company of Pennsylvania.

Exide-Manchex BATTERIES

ASSURE DEPENDABLE POWER FOR CARLISLE EXCHANGE

It's a progressive exchange in a progressive city... a fast-growing city. For among Pennsylvania's 50 largest cities, Carlisle ranks sixth in population growth during the ten years ending with 1950.

Rapid as this growth has been, the Carlisle Exchange has kept pace with the city's telephone needs. It serves approximately 8,000 subscribers, has a 23-position switchboard, and handles close to 40,000 calls per day. Standby power is provided by Exide-Manchex, the battery that assures:

POSITIVE OPERATION: dependable performance for all telephone battery requirements—central office and private branch exchange equipment.

ADEQUATE RESERVE POWER for emergencies beyond normal needs.

LOW OPERATING COST: extremely low internal resistance.

LOW MAINTENANCE COSTS: water required about twice a year. No change of chemical solution during life of battery.

LOW DEPRECIATION: sturdy, long-life construction which includes the exclusive manchester positive plate.

GREATER CAPACITY in a given amount of space avoids overcrowding of equipment.

These and other features combine to make Exide-Manchex *your best battery buy . . . AT ANY PRICE.*

THE ELECTRIC STORAGE BATTERY CO.
Philadelphia 2

Exide Batteries of Canada, Limited, Toronto

"Exide" & "Manchex" *Reg. T.M. U.S. Pat. Off.*

1888 . . . DEPENDABLE BATTERIES FOR 64 YEARS . . . 1952

Across The Editor's Desk

Congratulations to AL SEWARD, president, and the officers and directors of the Pennsylvania Independent Telephone Association on their outstanding convention held in April. Although we were unable to be in attendance our scouts tell us it was one of the outstanding telephone meetings of the year.

• • •

Earlier in April the Independents of Ohio met in Columbus. Familiar faces like DR. JONES of Athens, WARREN SAFFORD of Troy, COL. HIRSCH of Columbus and many other Pioneers were in attendance. The program presented by LLOYD WRIGHT included members of the Ohio commission and was unusually well attended. RALPH LUCIER and GEORGE STEELE were over from Warsaw, Indiana.

• • •

We enjoyed seeing our old friends JO POPPLETON, NORM SHENK, DAVE KAFKA, CARL BROREIN, JR. and many other of the swell folks at the Peninsular Telephone Co., Tampa, during a recent holiday trip to Tampa, Fla. with our family. And particular thanks to GROGAN SHELOR, the Automatic Electric representative, for his hospitality while there. We had a chance to visit P. D. BURKETT and introduce a new neighbor to him. Thanks for the wonderful welcome, GEORGE ROSE, we enjoyed the coke.

• • •

We predict a wonderful future for JIM MORRISON in his role as secretary of the Nebraska Telephone Association. His first meeting in March was well programmed and well attended. Following the footsteps of GEORGE KLOIDY is a tough assignment but Jim, as a second generation telephone man, is well equipped for the job.

The National Telephone Magazine

Telephone Engineer and Management

MAY, 1952 VOL. 56, NUMBER 5

Editor, RAY W. SMITH • *Advertising Director,* ROY F. SMITH
Managing Editor, JOHN G. REYNOLDS
Financial Editor, ALBERT W. KIMBER
Production Manager, VIRGINIA McCOLLUM
Advertising Manager, DON C. SORENSEN
Washington Bureau, ROLAND C. DAVIES *and* FRED HENCK
Circulation Manager, VIOLET ALTMEYER

ARTICLES

Editorial—"The High Cost of Telephone Growth" 35
Washington Bureau Reports *Roland Davies and Fred Henck* 22
New Construction Methods *John S. Reed* 38
Measuring The Coupling Between Contigous Telephone Circuits, *Jefferson Clark Davis* 41
Modern Central Office Maintenance *John S. Reed* 45

FEATURES

Coming Conventions 23
Across The Editor's Desk 4
Telephone Engineer Newsletter 11
Industry News Briefs 14
Small Company Talk *Bill Corman* 56
Questions & Answers *Jay G. Mitchell* 62
Association Activities 76
The Back of The Book *John G. Reynolds* 106

DEPARTMENTS

Professional Cards 73
Classified Advertising 90
Buyer's Guide 92
New Products' Showcase 92
Advertisers Index 105

FRONT COVER

April 17 and 18 were busy days for Illinois Independents as they held their 47th annual convention at the Hotel Abraham Lincoln, Springfield.—*(Photograph taken by Robert W. Mathews of the General Tel. Co. of Illinois, Springfield.)*

Published monthly by TELEPHONE ENGINEER Publishing Corp.
7720 Sheridan Road - Phone Rogers Park 4-3040 - Chicago 26, Illinois
West Coast Representatives, BRAND & BRAND
1052 West 6th Street, Los Angeles, California

Copyright 1952 by Telephone Engineer Publ. Corp.

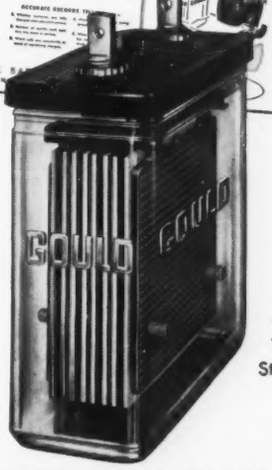
VOLUME 56, NUMBER 5. Published monthly by Telephone Engineer Publishing Corporation. Office of Publication, Pontiac, Illinois. Executive and Editorial Office, 7720 Sheridan Road, Chicago, Illinois. Subscriptions: U. S., Cuba, Mexico, $3.00 per year; Canada $3.50; in all other countries, $5.00. Single copies, U.S.A. 35 cents. Entered as second class matter at the post office at Pontiac, Illinois, under the act of March 3, 1879.

More Help Now Available to You with the . . . GOULD Plus-Performance Plan

New FREE Check-Chart for Battery Maintenance Men

Just what you need for your battery room! Establishes rules to follow, eliminates hit-and-miss maintenance methods, guides new help, reduces training time, assures continuous battery care, prolongs battery life, cuts accidents. Size 17" x 22". Printed on heavy stock and varnished for durability and easy cleaning.

Here is the latest addition to GOULD PLUS-PERFORMANCE PLAN service. Used in conjunction with the Plan's vast library of articles, bulletins, specifications, manuals, record cards, charts and graphs, this battery maintenance check-chart makes it even more possible to improve battery performance as much as 50%, increase output, save man-hours and cut costs. Like all GPPP material, it's FREE to users of the Plan.



Gould Planté—
The Aristocrat of
Stationary Batteries

BATTERY MATERIALS ARE SCARCE—AND GETTING SCARCER EVERY MONTH! IF YOU NEED BATTERIES, LET US QUOTE ON YOUR REQUIREMENTS *NOW*.

Mail this Coupon Today

GOULD
STORAGE BATTERIES

GOULD-NATIONAL BATTERIES, Inc.
Trenton 7, New Jersey

Always Use Gould-National Automobile and Truck Batteries

GOULD-NATIONAL BATTERIES, INC., Trenton 7, N. J.

Please send full information on the GOULD PLUS-PERFORMANCE PLAN including FREE check-chart for Stationary Battery maintenance.

NAME_____

FIRM_____

ADDRESS_____

CITY_____ ZONE_____ STATE_____

FUTURISTIC - REALISTIC

The portrait of your future is Completed

Your portrait of the future is ready! . . . Kellogg *Crossbar*—in tune with the future, designed and built for the future—*is a realism of Today!*

Crossbar is built to last—designed for growth! It is so flexible that it can be easily and economically expanded from ten to ten thousand lines. It fits your needs of now, of next year, and of many years to come.

No wiring or soldering is needed to add *Crossbar* units. And wear of moving parts is so slight as to be negligible! The need for stocking replacement parts is minimized to the Nth degree.

There is no other switching equipment that can *hold a candle* to *Crossbar,* exclusive with Kellogg! . . . None to equal its speed, its capacity, its over-all superiority and economy!

GET THE FACTS—You owe it to yourself and to your subscribers to find out all about *Crossbar*—how it is geared to the inter-toll, nation-wide dialing for which it has been designed. MAIL THE COUPON TODAY.

GET THE FACTS—MAIL THE COUPON TODAY

This interesting, instructive booklet is yours for the asking. Ask for it NOW!

KELLOGG *Crossbar*

10 to 10,000 Lines

SUPERIORITY— PROVED BY USE

KELLOGG CROSSBAR SWITCH

MAGNETIC IMPULSE COUNTER

4000 TYPE RELAYS

KELLOGG SWITCHBOARD AND SUPPLY COMPANY
6650 S. Cicero Ave., Chicago 38, Ill.

Please send me free copy of "GROWTH"—the story of Crossbar.

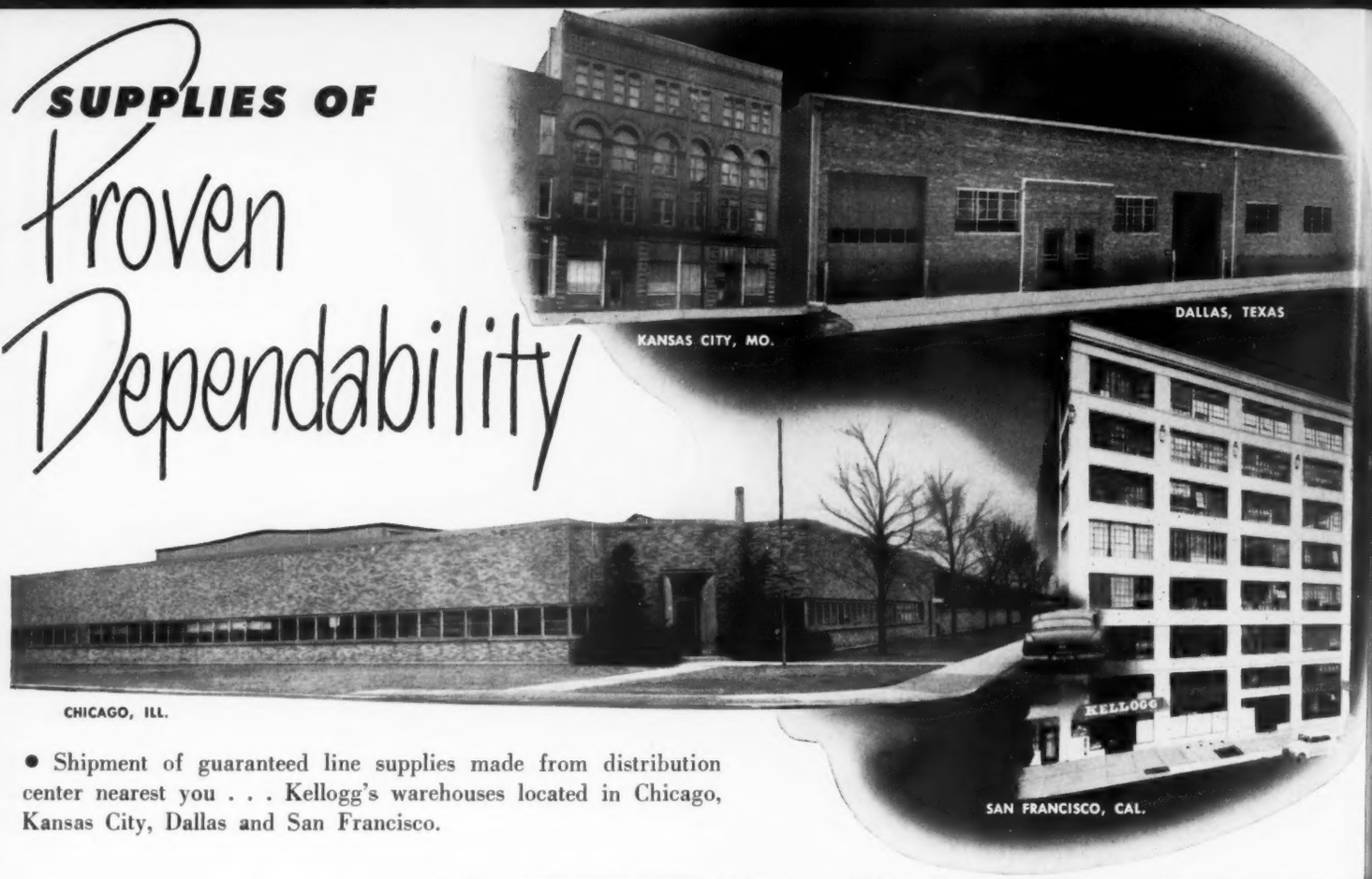
NAME_____ TITLE_____

COMPANY_____

ADDRESS_____

CITY_____ ZONE_____ STATE_____

SUPPLIES OF Proven Dependability



• Shipment of guaranteed line supplies made from distribution center nearest you . . . Kellogg's warehouses located in Chicago, Kansas City, Dallas and San Francisco.

The following nationally-known manufacturers of supplies for the independent telephone field are participating in the 1952 Kellogg Co-Operative Campaign.

American Creosote Works, Inc.

American Structural Products Co.

Ansonia Electrical Company

Bishop Manufacturing Co.

Boston Woven Hose and Rubber Company

Churchill Cabinet Company

Continental Cross-Arm Co.

Cook Electric Company

Copperweld Steel Company

The Electric Storage Battery Co.

General Insulated Wire Works, Inc.

Gould-National Battery Inc.

W. A. Hammond Drierite Company

Indiana Steel & Wire Company

Kester Solder Company

Lorain Products Corporation

T. J. Moss Tie Company

National Carbon Company
A Division of Union Carbide and Carbon Corporation

National Telephone Supply Co.

Newman Manufacturing Company

Paragon Electric Company

Ray-O-Vac Company

Raytheon Manufacturing Co.

Reliable Electric Company

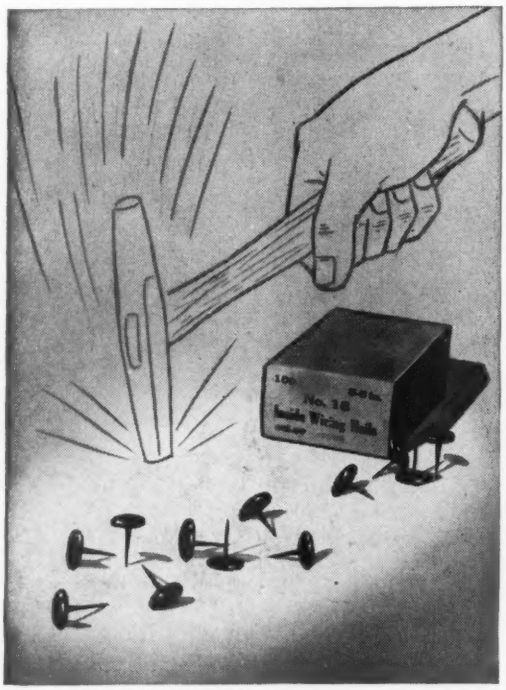
M. M. Rhodes & Sons Company

Schauer Manufacturing Corp.

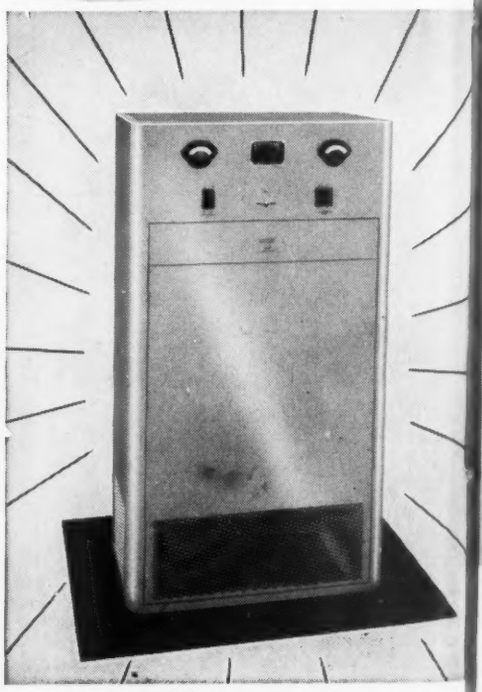
Taca Cable Stripper Manufacturing Co.

Vulcan Electric Company

Weller Electric Corp.

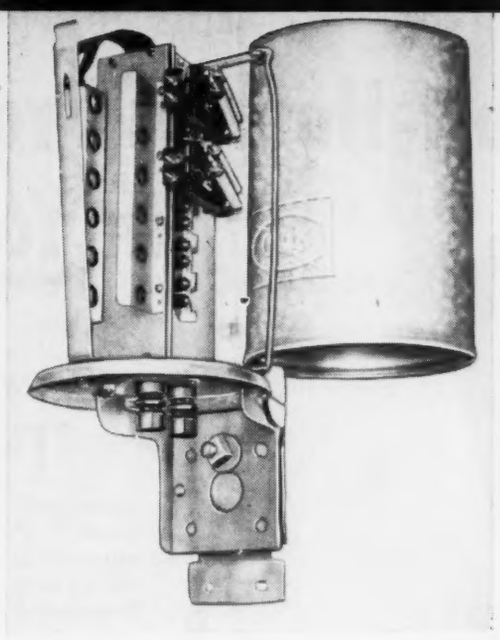


Why Do It the Hard Way? Making neat installations is easy—with Rhodes Wiring Nails! Designed for telephone work—quality insured by driving, bending, withdrawing and immersing tests. Made by M. M. RHODES & SONS CO., in several colors and pin-lengths.



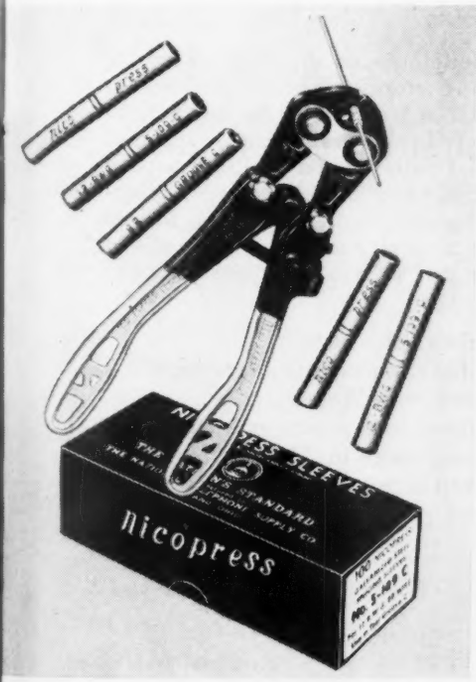
It Regulates—it Compensates. Flotrol Battery Chargers assure continuous power savings by low standby losses combined with high overall efficiency. Compensation for variation in input voltage is automatic and practically instantaneous. Made by LORAIN PRODUCTS CORP.

Cut "Trouble Shooting" Expense! — Install PARAGON ELECTRIC COMPANY'S top quality drop wire. Great tensile strength, high conductivity, and perfect adhesion are some of its outstanding qualities. This drop wire is available in Copperweld or High Tensile BB Bronze.

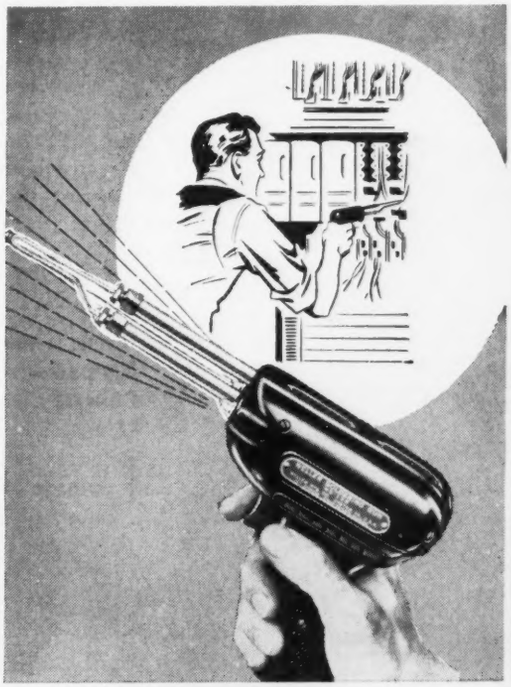


Added Versatility! For use with plastic cable, the new S-20V Cable Terminal is made with 2 cable entrances; when one cable is required, pipe plug is inserted in other entrance. Order couplings and plugs later to conform to cable layout. Made by COOK ELECTRIC CO.

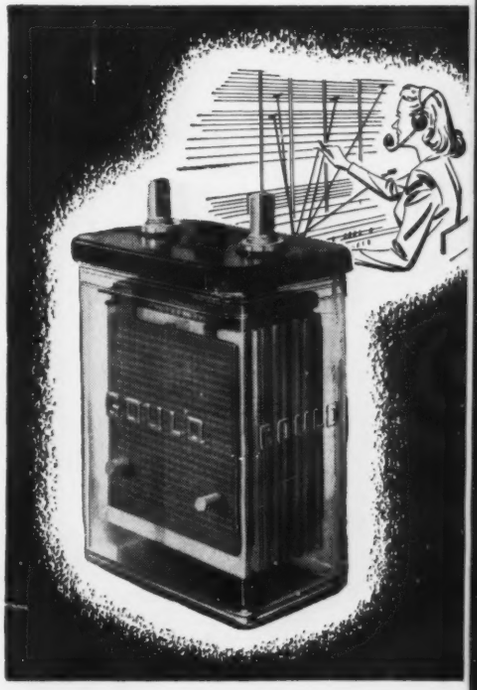
Drier Than A Desert! The quick, easy, positive way to dry splices in lead covered cables is to sprinkle Drierite Dessicant granules in among the conductors. This W. A. HAMMOND DRIERITE COMPANY product will not harm the sheath, conductors or insulation.



Together they Make the Perfect Splice—for splicing two wires, there's nothing simpler than using the No. 31 Nicopress Tool and Nicopress Sleeve. Splices are always tight and strong. Both products are made by the NATIONAL TELEPHONE SUPPLY COMPANY.



For All Telephone Soldering! The original dual-heat Weller Solder gun handles all jobs. Instant heat saves time, power. Prefocused spotlights and longer reach—no wedges or flashlights. Tough, dielectric plastic housing. Made by WELLER ELECTRIC CORPORATION.



Outstanding Battery Performance is yours when you choose Gould Planté Batteries. Thick, grooved, pure lead positive plates give many years of trouble-free service! Made by GOULD-NATIONAL BATTERIES, INC., a leader in their field. They're the finest money can buy.

Send Your Next Order for Supplies to

KELLOGG SWITCHBOARD AND SUPPLY COMPANY

Established 1897

SUPPLIES

WAREHOUSE AND OFFICES: 6000 W. 51st Street, Chicago 38, Illinois
308 W. 6th Street, KANSAS CITY 6, MISSOURI
105 Glass Street, DALLAS 2, TEXAS
1663 Mission Street, SAN FRANCISCO 3, CALIF.

OFFICES:
406 South Main Street, LOS ANGELES 13, CALIF.
720 S. W. Washington St., PORTLAND 5, OREGON
912 Pioneer Building, ST. PAUL 1, MINNESOTA

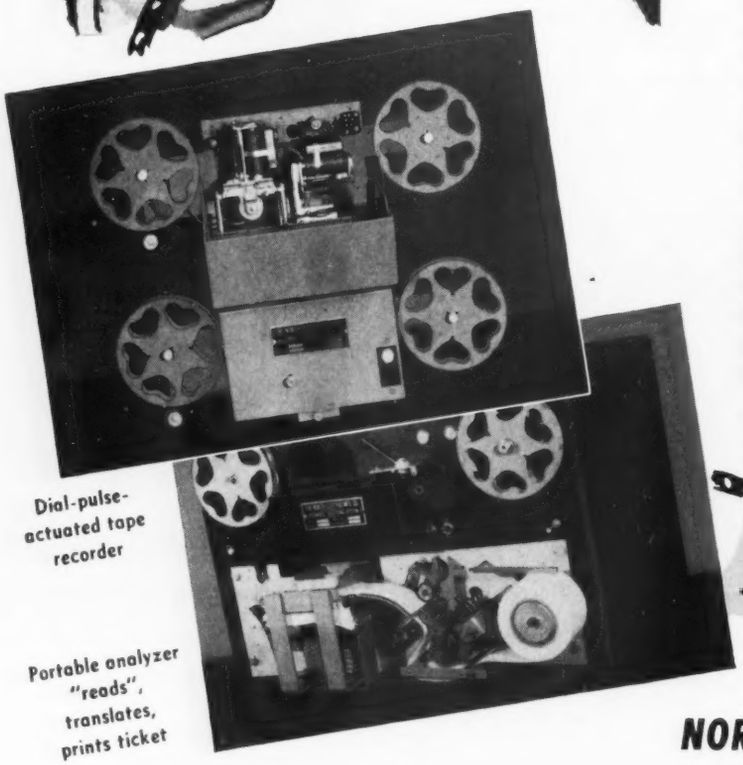
Make "Short-Haul" a Profit Toll in Your System!

THE time has come when any automatic telephone company can consider the short-haul toll problem without shuddering. North's new AuTollizer provides a method of converting this headache into a "helpmate" by taking low rate calls *away* from the regular toll board and placing them under fully automatic supervision.

First: the initial cost of this new toll-ticketing method is less than anything previously offered. Furthermore: with the AuTollizer system, made exclusively by North, the overall cost of supervision, recording and billing short-haul toll traffic, for the first time in telephone history works out to show a profit in the revenue from such calls.

The AuTollizer eliminates the need for expensive toll-ticketing storage circuits and translators. It employs, instead, low-cost tape-punching recorders (one per toll trunk) actuated directly from dial pulses, and a new inexpensive analyzer that combines tape "reading", translating, cost computing and printing, all in one unit. Result is a new and greatly simplified system that can be "proved in" quickly in any automatic exchange.

It cuts overhead on low-rate tolls
Does complete ticketing without supervision
Delivers computed toll tickets . . . or . . .
Operates automatic card-punching machines
Releases toll board space for higher rated calls
Fits large or small exchange operation



Dial-pulse-actuated tape recorder

Portable analyzer "reads", translates, prints ticket

NORTH'S AuTollizer
SAVES BY SIMPLIFYING!

THE NORTH ELECTRIC MANUFACTURING COMPANY

Originators of ***ALL RELAY*** *Systems of Automatic Switching*

1430 South Market Street, Galion, Ohio, U.S.A.

NEWSLETTER
TELEPHONE ENGINEER

Fortnightly TELEPHONE ENGINEER ★ TELEPHONE ENGINEER AND *Management*
ON THE 1st OF EACH MONTH ON THE 15th OF EACH MONTH

NEWSLETTERS *on Alternate Weeks*

May 15, 1952

Dear Sir:

Reflecting improved allocations granted to communications industry by Defense Production Administration for 3rd quarter of 1952, allotments to individual companies which have been mailed by National Production Authority's Communications Equipment Division provide "tickets" for obtaining quantities of copper, steel, & aluminum which are larger than any previously allotted since controlled materials plan was put into effect by government in July, 1951.

Incidentally, Communications Equipment Division was one of first three of all NPA divisions to complete job of mailing out allotment forms. According to NPA officials, this fact demonstrates high efficiency that has been developed in this government agency, which has reputation for "smooth operation" among DPA-NPA officials. CED was the first in Leather, Textiles & Special Equipment Bureau of NPA to complete this job.

High allotments were particularly evident for wire & cable construction programs in communications industry, NPA officials reported.

* * *

Four farm telephone loan allocations, totaling $1.76 million, have been announced by Rural Electrification Administration. The loan allocations amounted to $353,000 for the Perham (Minn.) Tel. Co., serving Ottertail & Becker Counties; $395,000 for Crow Wing Cooperative Rural Tel. Co., Brainerd, Minn., serving Crow Wing, Cass, & Morrison Counties; $116,000 for Brantley Tel. Co., Nahunta (Ga.) serving Brantley & Charleston Counties; $896,000 for Grand River Mutual Tel. Corp., Trenton (Mo.) serving Grundy, Mercer, Harrison, and Davies Counties, which will purchase seven exchanges from three small Independents.

* * *

In finalizing a 5-month-old rule proposal designed to meet increasing demands for frequencies in public radio communications services by telephone companies operating landline communications systems, & to afford greater flexibility for radiotelephone service to land vehicles on heavily traveled highways bordering Great Lakes & Lake St. Clair, FCC has opened up 2 new frequency pairs in 35-44 megacycle band; rearranged

its zone boundary set-up for this frequency band, & made 2nd frequency, 35.58 mc, available for assignment for one-way signaling (radio-paging) service. The domestic public land mobile radio service rule amendments are to become effective May 26.

Originally announced last November, the new rules assign one of new frequency pairs, 35.50 & 43.50 mc, to zone including Indiana, Lake St. Clair, Michigan, New Jersey, New York, Ohio, Pennsylvania & the Great Lakes, & the other pair, 35.62 & 43.62 mc, to a zone including Arkansas, Oklahoma & Texas. These frequencies had originally been allocated to public radio communications services but had not been assigned to specific zones. The rule amendments do not affect frequency assignments to miscellaneous common carriers -- those not engaged in business of providing public land-line message service -- or two pairs of frequencies in 35-44 mc band assigned to Western Union Telegraph Co. for facsimile operations.

Comments had been received by Commission from five interested parties, with the only oppositions to proposal filed by United States Independent Telephone Association & the Lorain County Radio Corp. USITA commented that it favored proposal to assign additional frequencies but said that Great Lakes & Lake St. Clair should not be included in zones. Lorain County comments were substantially same as part of those of USITA's.

* * *

HIGHLIGHTS:- Tritel Rural Tel. Co-op organized to serve 3-county area near Denton, Tex. John D. Faught, Justin, Tex., is chairman of board . . . Bald Knob, (Ark.) Tel. Co. plans rebuilding of entire cable system in $30,000 project. Entire plant was destroyed by recent tornado . . . Western Ill. Tel. Co. is rebuilding entire plant at Joy, New Boston, Little York, Seaton, & Aledo, Ill. . . . Winnebago Co-op Tel. Assoc., Lake Mills, Ia., started construction project . . . Clyde C. Sanders named manager of Central Tel. Co-op., Hamilton, Tex.

Mrs. Rose Carr, operator for Missouri Tel. Co., Clark, Mo., received Pioneer Pin denoting 35 years of service . . . Woodhull (Ill.) Tel. Co., reorganized as Woodhull Community Tel. Co. with Theodore Johnson, pres. New company includes 9 rural companies . . . Ghent (Ky.) Tel. Co. being organized . . . Linn County Tel. Co., Lebanon, Oregon, completed conversion of Brownsville, Ore., exchange to dial . . . Lost Nation & Keystone (Ia.) Tel. Cos. planning to merge. Prophetstown, Ill., Tel. Co. plans conversion to automatic . . . Northwest Mutual Aid Tel. Co., Williston, N. D., plans application for REA loan.

Ray Smith

Ray W. Smith, Editor

Thompson Chemicals

FIRST NAME IN BRUSH KILLERS

EXTRA CREEP for EXTRA KILL with

LOW VOLATILE BRAMBLE-WEEDICIDE

Bramble-Weedicide contains H-31, the Thompson patented creeping agent because field tests prove it definitely steps up killing effect.

Woody growth control is also intensified by the use of low volatile pentyl esters. The molecular structures are absorption-rated to assure greatest herbicidal effect. For these reasons, Bramble-Weedicide is more effective and economical than older chemical controls.. first choice of more and more utilities.

Whether you spray by truck, tractor, knapsack, plane or basal bark . . . specify Bramble-Weedicide.

Thompson manufactures many types of brush and weed killers. Write for helpful information on specific problems.

WHEN TO SPRAY BRAMBLCIDE

BRAMBLCIDE is the Thompson low volatile pentyl esters of 2, 4, 5-T fortified with H-31 for extra killing surface creep. BRAMBLCIDE is used for controlling mesquite, huisache, Mc Cartney's rose, osage orange, prickly pear, oak, post, and black jack either by foliage spray or basal stem. Some utilities report that despite a slightly higher cost, (a smaller quantity is needed) it is the preferred herbicide for basal bark or stump treatment.

Thompson Chemicals

other superior

WEED & BRUSH KILLERS

- **WEEDICIDES:** 2,4-D Esters and Amines
- **BRAMBLCIDE** 2,4,5-T Low Volatile Ester
- **PHYTOCIDE** } General Weed Killers
- **PENTA-WEEDICIDE** }

Send for helpful booklet:
HOW TO CLEAR RIGHTS-OF-WAY

Thompson **CHEMICALS CORP.**

St. Louis 3, Missouri
Los Angeles 27, California

North Carolina Utilities Commission Chairman Stanley Winborne is pictured above as he congratulated the Carolina Telephone & Telegraph Co., following the dial conversion of the Henderson exchange. Seated are J. R. Teague, Henderson postmaster; J. R. Porter, chairman of the board; M. Y. Cooper, director; E. H. McMahan of the Utilities Commission; L. W. Hill, president; and J. C. Gardner, Citizens Bank & Trust Co., of Henderson.

Industry News Briefs

Edited By

JAMES A. BOYD

CAROLINA T. & T. CO.: Cutover at Henderson

CLIMAXING a major improvement and expansion program in Henderson, N. C., the Carolina Telephone & Telegraph Co. recently converted the entire exchange to dial operation.

Nearly 4,000 stations were affected by the dial conversion which required the construction of a new, modern, central office building and the installation of local and long distance equipment. Offices of the district manager are located in the new building as are local offices and the Henderson business office. Total cost of the conversion was approximately $1,500,000.

Among those who attended the Henderson conversion ceremonies were representatives of the city of Henderson and civic leaders of the area, representatives of nearby towns, members of the North Carolina Utilities Commission and of the commission staff, officials, guests, and representatives of the company and representatives of press and radio.

The Carolina Telephone & Telegraph Co. now operates 104 exchanges in 41 counties of eastern North Carolina. Conversion of the Henderson exchange leaves only 5 of the company's 104 exchanges on manual operation. Two of these are tentatively scheduled for dial conversion later this year.

ROCHESTER TEL. CORP.: Three Promotions

AT A RECENT MEETING of the board of directors of the Rochester (N. Y.) Telephone Corp., three of the officers and staff were promoted to new assignments.

William A. Kern, vice president, was promoted to executive vice president. Arthur S. Gibson, controller and assistant secretary, was promoted to vice president in charge of finance. H. Elwood White, assistant to the controller, was promoted to assistant-secretary.

Mr. Kern, a native of Buffalo, graduated from Colgate University in 1927 and entered the employ of the New York Telephone Company. After service in New York City and in Buffalo he was transferred to Rochester as traffic superintendent in charge of the long distance office. He entered the employ of the Rochester Telephone Corp. in May, 1935, as district traffic superintendent. He was promoted to traffic superintendent in 1944 and made a vice president of the corporation in 1945.

Mayor H. T. Powell of Henderson, N. C., is shown above as he made the first long distance call inaugurating the new Henderson toll facilities. D. F. Holliday, Carolina Telephone & Telegraph Co., manager at Henderson, looks on.

Mr. Gibson entered the employ of the Rochester Telephone Corp. as general bookkeeper in 1921, the year the present corporation was formed. He was promoted to chief accountant in 1925 and since that time has served as auditor, assistant treasurer, assistant secretary and in 1949 was elected to the position of controller. He is a past president of the Rochester Chapter, National Association of Cost Accountants.

Mr. White is a graduate of the University of Rochester and entered the employ of the Rochester Telephone Corp. in 1922 as a clerk in the engineering department. He was subsequently promoted to assistant engineer and in 1927 transferred to the Plant Department. In 1930 he was made chief clerk to the plant superintendent. In 1934 he was transferred to the accounting department as staff accountant. In 1949 he was made chief accountant and a short time later became assistant to the controller. Mr. White is a director of the National Association of Cost Accountants.

REA: Louisiana Cutover

APRIL 12 was a big day for residents of Bordelonville, La. In spite of a heavy rain and a tornadic alert, about 1500 persons filled the new Bordelonville gymnasium to celebrate Avoyelles Telephone REA Day.

The mayorless town along the Big

Bend of the Bayou des Glaises installed a new dial telephone system, the first such project in the state to be installed on a loan by the Rural Electrification Administration.

Visiting dignitaries included several mayors from nearby towns as well as political and religious notables.

Principal speaker at the celebration was Sen. Russell Long. who congratulated the Bordelonville community for being the first to benefit from the $400,000 REA loan made to the Avoyelles Telephone Co., Inc.

Other addresses were given by Wade O. Martin Sr., Louisiana public service commission and Al Cobb, president of the Louisiana Telephone Association.

A "Certificate of Quality Service" was presented by Daniel B. Corman, special assistant to the REA administrator, to William J. Camp Jr., manager of the Avoyelles Telephone Co.

The first dial call in the Henderson, N. C. exchange was made, as shown above, by Mayor H. T. Powell of Henderson as J. R. Teague, Henderson postmaster, M. Y. Cooper, director of the Carolina Tel. & Tel. Co., L. W. Hill, company president and J. R. Porter, chairman of the company board of directors, watch.

MERGERS:
Cave Springs, Ark.

THE ARKANSAS Public Service Commission is considering a request to grant authority to three Independent Benton County, Ark., telephone companies to form a corporation.

Seeking permission to merge and form the Benton County Telephone Co. are: Centerton Telephone Co., Centerton; Home Telephone Co., Gentry; and Cave Springs Telephone Co., Cave Springs.

According to the application the merger would be necessary from a financial standpoint if the area is to get badly needed additional service.

LINCOLN T. & T. CO.:
Hale Elected Vice Pres.

MERLE M. HALE was elected vice president in charge of operations of the Lincoln (Neb.) Telephone & Telegraph Co., at a meeting of the company's board of directors on April 16. For the past seven years he had been the company's general commercial superintendent. He succeeds H. H. Wheeler who died March 30.

Kenneth L. Lawson, formerly commercial engineer, succeeds Hale as general commercial superintendent.

Mr. Hale also was elected a member of the board and of the executive committee of the board.

H. W. Potter was elected as a member of the executive committee and Philip M. Aitken was elected as a member of the board.

Mr. Hale's first employment with the Lincoln Company was in 1919 as a groundman in the construction department. He later attended the University of Nebraska and was graduated with a Bachelor of Science degree in 1925. He resumed employment with the company in that year as a clerk in the commercial department at Lincoln and was advanced to the positions of directory and methods supervisor and commercial engineer before his appointment as general commercial superintendent. He is a graduate of the Advanced Management Program of Harvard University.

Active for many years in civic and telephone organizations, Mr. Hale is a past president of the Lincoln Kiwanis Club, the Nebraska Telephone Association, Nebraska Society of the Sons of the American Revolution, national president of the Independent Telephone Pioneer Association and last year was chairman of the Commercial Committee of the U. S. Independent Telephone Association. He is a member of the Executive Committee of the Cornhusker Council, Boy Scouts of America and a member of the Lincoln Chamber of Commerce, University Club, Hillcrest Country Club, Sigma Nu fraternity and other organizations.

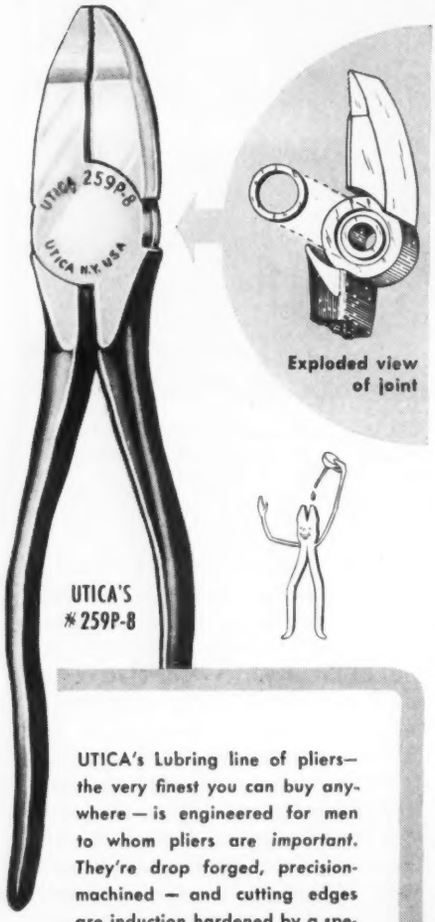
Merle M. Hale, v. p. in charge of operations of the Lincoln T. & T. Co.

Prominent also in Masonic circles, he is Grand Junior Deacon of the Grand Lodge of Masons of Nebraska, Past Master of Lancaster Lodge No. 54, A. F. & A. M., Senior Warden of the Delta Lodge of Perfection of the Scottish Rite, a member of the Sesostris Temple of the Shrine and a Past Patron of Temple Chapter 271, O.E.S. He is a member of Lincoln Lodge Number 80, B.P.O. Elks.

Mr. Lawson has been in the telephone business for 25 years. He began his employment with the company in 1927 as a solicitor in the Lincoln commercial office. In 1930 he was appointed as sales engineer on the general commercial superintendent's staff and became directory and methods supervisor in 1935. He was

(*Please turn to page* 16)

PLIERS THAT OIL THEMSELVES!



UTICA's Lubring line of pliers—the very finest you can buy anywhere — is engineered for men to whom pliers are *important*. They're drop forged, precision-machined — and cutting edges are induction hardened by a special UTICA process.

Each UTICA "Lubring" pliers has a ring of porous iron floating in the joint. This ring serves as a tiny reservoir for oil and releases it to the joint *as it's needed*.

In these days of limited replacements, why not make sure you get the long life and quality that go with UTICA?

UTICA Drop Forge & Tool Corp.
Utica 4, New York
In Canada:
Adlam Tool & Supply Co., Ltd., Montreal
Walls-Irons, Ltd., Winnipeg

It Pays U TI CA Quality To Use Tools

AND THE WORLD'S BEST TOOLS ARE MADE IN U. S. A.

Kenneth L. Lawson, general commercial superintendent of the Lincoln (Neb.) Tel. & Tel. Co.

promoted to commercial engineer in 1946.

A graduate of the University of Nebraska, Mr. Lawson is a member of the Aviation Committee of the Lincoln Chamber of Commerce, the Frank H. Woods Chapter of the Independent Telephone Pioneer Association, Lincoln Lodge Number 80 B.P.O. Elks, the Hillcrest Country Club and the Knife and Fork Club.

CAROLINA T. & T. CO.: King Earns Vail Award

JAMES ELMER KING, cable splicer's helper for the Carolina Telephone & Telegraph Co., Tarboro, N. C., was guest of honor on March 26 at a dinner held by the company in his honor. Occasion for the event was the presentation of the Bell System's Theodore N. Vail Award for heroism which King earned last year when he rescued a fellow worker from a flame-filled manhole.

On March 9, 1951, King and Cable Splicer J. W. Britt were working in a manhole in Fayetteville. Additional telephone cable was being placed in the underground conduit system and it was necessary for the men to work in the manhole. At a moment when Britt was working alone in the underground chamber, gas, which apparently had been accumulating for some time, suddenly ignited filling the manhole with intensely hot blue flame.

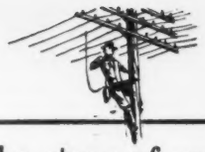
King, who was near the manhole opening, immediately shouted to Britt to get out of the hole. Although flames were billowing eight to ten feet above street level, King approached the opening and, reaching Britt who was attempting to escape from the hole, lifted him from the flames and assisted him until aid arrived.

Both of the telephone company men suffered burns, Britt being the most severely injured, and it is believed that through quick thinking and heroic actions without regard for his personal safety, King averted a fatal accident.

The Vail Award, a bronze medal, accompanied by a lapel replica, an inscribed scroll and a book "For Noteworthy Public Service" outlining previous awards, was presented to King by L. W. Hill, president of the Carolina Telephone & Telegraph Co. King also received a cash award of $100 from the Vail Fund, the check being

(*Please turn to page* 18)

James E. King, left, cable splicers helper for the Carolina Telephone & Telegraph Co., is shown as he received an inscribed scroll which accompanied the Vail Medal presented by L. W. Hill, President of the company. In the center is Mrs. King.



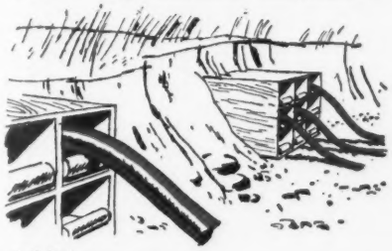
CHECKING THE LINE... via GraybaR

The story of underground installations—

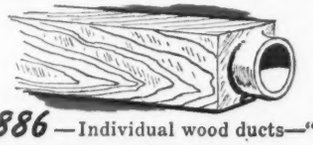
1881 — **Pittsburgh, Pa.** 3" overhead-type Patterson cables were laid in a wooden box and covered with pitch. (Cables consisted of 50 cotton-insulated #26 copper wires in a paraffine-filled lead sheath.)

1882 — **Attleboro, Mass.** A locomotive-drawn plow was used to lay 5 miles of ¾" lead pipe containing the first *gutta-percha*-insulated cable (21 wires) — between Attleboro and West Mansfield.

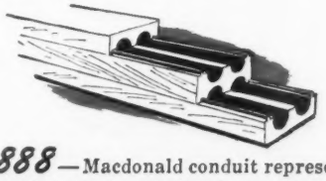
1882 — **Boston, Mass.** The first "drawing in" duct system was constructed of 18' wrought iron boiler tubes pretreated with gas tar and dead oil.



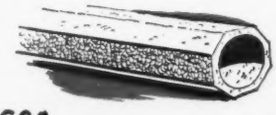
1884 — **Brooklyn, N. Y.** A creosoted wood "drawing in" system was installed. Built of 1½" lumber in 16' sections, it featured rollers to reduce cable-pulling friction.



1886 — Individual wood ducts—"Pump Logs"—were developed.



1888 — Macdonald conduit represented the ultimate in wooden duct systems.



1890 — The first vitrified clay conduit was used.

TODAY Since 1869, Graybar has supplied and kept abreast of new developments in telephone supplies. Today, you can order – from any of 108 Graybar offices – the most modern underground construction items available anywhere. Orangeburg fibre conduit, single- and multiple-duct clay conduit, mortar bandage material . . . duct rods, conduit rods, cable feeders . . . guard rails, barricades – all are products you know and respect.

20 tons of PUSH.

Graybar-distributed Greenlee hydraulic pipe pushers eliminate unnecessary tunneling and property damage. Easy-to-operate hydraulic unit can handle ¾" to 4" pipe . . . has 6 different operating speeds to match varying soil conditions.

REMEMBER, Graybar offers you convenient "one-order" service on *all* your telephone needs. In addition to construction tools and materials, we distribute telephones, wire, cable and apparatus. See for yourself — you'll save time and paper work by making your next order read *via Graybar.* 252-225

GRAYBAR ELECTRIC CO., INC.
Executive Offices:
Graybar Building, New York 17, N. Y.

Call Graybar first for... Everything in Telephone Supplies

IN OVER 100 PRINCIPAL CITIES

presented by A. L. Taylor, construction supervisor for the company.

The Vail Medal awarded to King is the first such award ever received by an employee of the Carolina Telephone & Telegraph Co. Since 1920, when the Vail Awards were originated as a memorial to Theodore N. Vail, former president of the American Telephone & Telegraph Co., only four such awards have been received by telephone company employees in North Carolina.

INCORPORATIONS:
Walhalla, N. D.

THE NEWLY incorporated Polar Rural Telephone Mutual Aid Corp. is preparing to serve communities now served by several small rural telephone companies in North Dakota.

Members of the company's board of directors are: Irvin M. Hanson, Dahlen, president; Andrew Slettebak, Petersburg, vice president; W. H. Krueger, Niagara, secretary-treasurer; Sam Mork, Petersburg; Dennis Monson, Edinburg; Lloyd Gire, Edinburg; Orlin Nelson Edinburg, and E. K. Olafson, Mountain. W. T. DePuy, Graton, is legal adviser.

The cooperative has options for purchase of the Flem Telephone Co. of Petersburg and Niagara, the Dahlen Telephone Co. of Dahlen; the Ryan Telephone Co. of Inkster; and the Edinburg-Gardar Telephone Co., now serving towns and rural areas surrounding Edinburg, Gargar, Mountain and Union.

Ringgold, Neb.

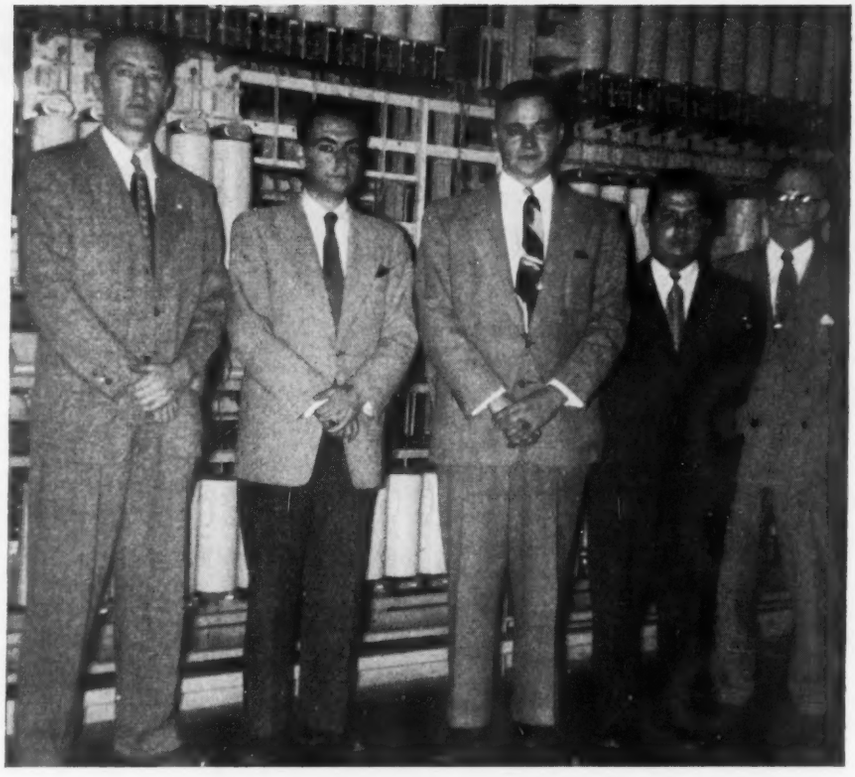
THE RINGGOLD Telephone Co. recently filed notice of incorporation showing capital stock of $2000 divided into 20 shares.

The officers of the corporation are: Joe H. Schmidt, president; Clyde Wilson, vice president; and George W. Wade, secretary-treasurer.

Searchlight, Nev.

PLANS FOR THE first telephone service in Searchlight, Nev., in more than 25 years and to the Lake Mohave area were revealed with the ruling by the Nevada Public Service Commission giving the United States Long Distance Telephone Co. a certificate of convenience and necessity.

According to the petition filed before the commission, the company stated that the Searchlight area is capable of supporting a telephone company. The petition said that Searchlight originally was serviced by telephone more than 25 years ago, but the line was abandoned when the Santa Fe Railroad discontinued its runs into the area.



Alfonso R. Rodriguez and Marcelo A. Paredes, telephone executives of Quito, Ecuador, made a recent inspection tour of the Marion, Ohio, telephone central office and exchange distribution facilities. From left to right in the above photo are: W. C. Kimbal, plant engineer of Ohio Associated Tel Co.; Mr. Paredes; R. M. Wopat, vice pres. of Ohio Associated; Mr. Rodriguez and H. G. Duhamel, equipment engineer.

RATES:
Landa, N. D.

THE FARMER MUTUAL Telephone Co., Landa, N. D., has been authorized by the North Dakota Public Service Commission to raise charges from $3.50 to $4.50 a month, for both town business and residence service; from $3.50 to $4.50 for rural metallic, and from $3.00 to $4.00 for rural one-wire service.

Pukwana, S. D.

A RATE INCREASE of 50c per month for business and residential service has been granted to the Home Telephone Co. of Pukwana, S. D., by the South Dakota Public Utilities Commission.

RURAL:
Devils Lake, N. D.

NORTH DAKOTA'S newest telephone co-op is all set for business as a result of action taken during a recent meeting of 150 farmers and businessmen from Ramsey, Towner, Cavalier and Benson Counties. With Walter Anderson of Crary, N. D., presiding, the group decided to call the co-op The United Telephone Mutual Aid Corp. and give it the task of providing adequate telephone service for rural Lake Region areas.

Members of the temporary board of directors are: Mr. Anderson, E. L. Kalinowski, Crary; Francis Kitsch, Garske; Maynard Maetzold and Burton Wood, Devils Lake; Fred Bucholtz, and L. J. Bartch, Rock Lake; Melvin Vesterso and Rienhold Goschke, Clyde; Earl Higgins and I. E. Weston, Sarles; E. K. Douglas, Osnabrock and Frank T. Bata, Dresden.

Kitsch was named temporary president of the board, Bartch, vice president and Kalinowski, secretary-treasurer.

Co-op Awards Contract

APRIL was busy month for directors of the Caprock Rural Telephone Co-op, Spur, Texas. Seven contractors had submitted bids for the construction of 256 miles of REA-financed telephone lines to serve 800 rural subscribers. With bids ranging from $476,387 to $410,116, Caprock officials awarded the contract to the low bidder, the Alpha Construction Co., Tulsa, Okla.

Part of a million-dollar construc-

tion program for the Caprock Co-op, the contract represents the first step toward bringing telephone service to farmers and ranchers living in a 7-county area surrounding Spur.

Exchange areas included in the section covered by the contract are: Clairmont, Peacock, Girard, Dry Lake, Swenson and Jayton. Central office equipment for these areas and others to follow is being furnished under a contract awarded in February.

Plan New Texas Co-op.

WITH THE blessing and support of the Bowie, Texas, Chamber of Commerce, a move for a Rural Telephone Co-op for the Bowie area has resulted in a petition for such service signed by several hundred potential subscribers in Sunset, Bellevue, Newport and neighboring communities.

North Dakota Co-op Organizes

LATEST addition to the steadily growing list of new telephone co-ops is the newly organized United Telephone Co-op covering rural areas in Rolette County, N. D.

Walter Anderson of Crary, N. D. is president of the new group and Ed Kalinowski of Devils Lake, secretary.

Other board members are: Francis Kitsch of Garske; Maynard Maetzold of Devils Lake; R. Wood of Warwick; Ray Bartch of Rock Lake and Melvin Vesterso of Clyde.

New Co-op at Denton, Tex.

BACKED by over 400 rural residents of Denton County, Texas, organization of the Tri-Tel Rural Telephone Co-op was perfected at a recent meeting.

Chairman of the new co-op is John D. Faught of Justin. Directors are Curtis Dooley of Argyle; Melvin Thompson of Roanoke; Ray Swafford of Ponder; B. S. Carter of Rhome; W. A. Sharpe of Haslet; Wayne Cox of Justin; Howard Clark of Bartonville; and Bill Marshall of Stony. Denton County Agent Al Petty is temporary secretary.

Estimated cost of the venture was placed at $250,000.

Co-op Buys 5 Exchanges

AN EARLY START on development of rural telephone system serving Barren, Metcalfe, Hart, Allen and Monroe Counties, Ky., was forecast recently as negotiations were com-

(Please turn to page 75)

Free Literature Department

New Product Literature of Practical Interest

CALCULAGRAPH — New catalogs on automatic toll time calculating and recording. Write Calculagraph Co., Harrison, N. J.

CMU WEED KILLER—Free leaflet gives details on Du Pont 80% CMU Weed Killer. Write Du Pont, Grasselli Chemicals Dept., 5031 Du Pont Bldg., Wilmington, Del.

INSULATING TAPE—New booklet describes a new electrical insulating tape for wire or cable splicing. Tape offers complete protection against moisture, acids, alkalies, sunlight, corrosion, fungus and ozone. Write Bishop Manufacturing Corp., 10 Canfield Road, Cedar Grove, N. J.

DERRICK & DIGGER UNIT —Illustrated booklet No. 325 descibes new derrick and digger unit for ¾ and 1-ton trucks. Write Tel-E-Lect Products, Inc., 10,013 Minnetonka Blvd., Minneapolis 16, Minn.

POCKET TOOL GUIDE—For your free copy of the Klein "Pocket Tool Guide," write Mathias Klein & Sons, 3200 Belmont Ave., Chicago 18, Ill.

BATTERY MAINTENANCE CHART — Gould-National Batteries, Inc., Trenton 7, N. J. offers a two-color 17x32 inch check-chart designed to improve the maintenance of stationary batteries. The check-chart tabulates the procedures to follow in the basic maintenance operations and shows how often each should be done.

For copies of the check-chart write Gould-National Batteries, Inc., Trenton 7, N. J.

THE LENKURT "DEMODULATOR"—The Lenkurt "DEMODULATOR" is a new house organ which will be mailed regularly to individuals interested in the field of telephone and telegraph carrier equipment. Each issue will contain articles on such subjects as special problems of carrier operation, interesting or unusual applications of carrier equipment, and methods of using carrier equipment to obtain better and more economical communication channels.

The name "DEMODULATOR" has been selected to indicate the publication's objectives: to select the important facts from available data on carrier subjects and present them in a readily understandable manner.

Requests for the "DEMODULATOR" should be addressed to the Publications Department, Lenkurt Electric Co., San Carlos, Calif. and should include name, company, position and address.

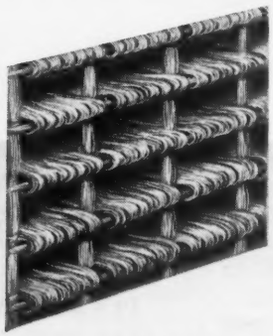
FIFTY YEARS OF EXPERIENCE

General Cable Corporation's half century of experience and research assures you of time-tested quality in

TELEPHONE WIRES AND

PAPER INSULATED CABLE...

Bright annealed copper wire conductors, dry paper insulation and a uniform lead-antimony sheath. This cable is furnished with coverings to make it suitable for aerial, underground or submarine service.



EXCHANGE & SWITCHBOARD WIRE...

Solid or stranded, tinned or alloy coated, annealed copper conductor. Covered with a wall of insulating compound and a finish saturated with flame, heat and moisture-resisting compounds. A flame and heat resisting finish is provided overall. This covering, as illustrated, is impervious to moisture, oil, acid or similar solutions.

"More Power to You" ®

Six years after the first telephone was exhibited, paper insulated cables were being made. Since then, the General Cable Corporation has played an outstanding role in the development and manufacture of all conductor arteries of the telephone system.

The standard constructions of General Cable paper insulated cable, switchboard and service drop, inside and outside telephone circuits fulfill all telephone installation needs.

General Cable engineers stand ready to furnish advice re: your telephone wire and cable projects. Contact your nearest General Cable office today.

GENERAL CABLE
CORPORATION

EXECUTIVE OFFICES: 420 LEXINGTON AVENUE, NEW YORK 17, NEW YORK • SALES OFFICES IN PRINCIPAL CITIES OF THE UNITED STATES

Washington Bureau Reports

By ROLAND DAVIES and FRED HENCK

REA establishes separate divisions devoted entirely to telephone activities . . . R. A. Dell will lead REA's new telephone loan division . . . NPA revises Order M-77.

THE MAJOR emphasis laid on its farm telephone loan program by the Rural Electrification Administration has been made even clearer by a reorganization of REA which establishes for the first time separate divisions devoted entirely to telephone activities, and puts the size of the telephone staff on a par with electrification personnel.

REA Administrator Claude R. Wickard, in explaining the reorganization, effective July 1, said that the telephone staff will be increased by 50% "as rapidly as the people can be shifted from the electric program and trained." As a result, REA will have about 400 people directly assigned to telephone work, another 400 working on rural electrification matters, and about an equal number in administrative divisions which handle both telephone and electrification activities.

The shift of REA activities to greater emphasis on telephone loans again points up the action of the House Appropriations Committee in writing virtually a "blank check" for telephone loan authorizations in the Agriculture appropriations bill. The committee report declared that past history indicates Congress will make additional loan funds available if those approved prove to be insufficient.

Under the new REA organization, Richard A. Dell, who has headed the Applications and Loans Division—to be abolished July 1—will head a new Telephone Loans Division. Edgar F. Renshaw, who has been Mr. Dell's assistant for telephones, will be Assistant Chief of the new division.

K. W. Benckert, recently appointed Assistant Chief of the Engineering Division for telephones, will be Acting Chief of a new Telephone Engineering Division, while Hoburg B. Lee, until recently a regional head in the Engineering Division, will be Assistant Chief.

GOING FULL BLAST

The Telephone Loans Division, Mr. Wickard repeated, "will be in charge of loan study and development work and management assistance for the telephone program, and will make recommendations to the Administrator on telephone loan applications. The Telephone Engineering Division will be responsible for such activities as pre-loan engineering, construction engineering, and technical operations and maintenance advisory service to borrowers."

Some of the present REA divisions —Applications & Loans, Accounting & Auditing, Management, and Engineering—will be abolished. Four staff divisions which remain essentially unchanged are Technical Standards, Personnel, Information Services, and Administrative Services. Three new staff divisions are being set up—Controller's, responsible for all auditing functions; Engineering, covering engineering policies and procedures;

and Operations, to provide management consultant and specialist services.

Although there are apparently less than 1000 REA-financed new telephones currently in operation, the agency expects that a comparatively substantial number of cutovers will be staged in the summer or early fall of this year.

Agency sources said there is REA-financed telephone construction going on in many states, but that a 24-month delivery time is generally being quoted by supplies of central office equipment, and that it has been hardly more than that long since the first REA telephone loan allocation was made.

There are, of course, other REA-financed telephones in service, but those are stations taken over by borrowers from existing organizations which have been acquired.

However, it is understood that REA Administrator Wickard has not been satisfied with progress in the telephone field to date, and decided that the reorganization, to give REA telephone activities at least an equal position with electrification activities of the agency, will permit greater progress and also will bring new faces and new ideas into the telephone program.

Meanwhile, the recommendations of the House Appropriations Committee for loan and operating funds for the Rural Electrification Administration telephone and electric lending programs for the forthcoming fiscal year were approved without change by the House in passing the Agriculture Department money bill for the upcoming 1953 fiscal year.

The bill calls for $25 million in new loan authority for the REA telephone program, with an additional $10 million available for telephone loans if necessary.

In the brief discussion of REA during debate on the bill, Rep. Wright Patman (D., Tex.) was the only speaker. He said REA is operating today with a smaller number of employees and a much larger workload than it had in 1941. He contended that comparatively little progress has been made in the rural telephone field by commercial companies since 1945, and declared that the REA telephone program "holds big promise for the rural people who have waited so long to get reliable telephone service."

NPA Revises Order M-77

THE LONG-RANGE program for the National Production Authority's Communication's Equipment Di-

(*Please turn to page* 26)

Coming Conventions

"There has never been a time . . . when it was more necessary for telephone people to take common counsel upon common problems."

Wisconsin State Telephone Association, Park Hotel, Madison, May 14 and 15.

Kansas-Missouri Telephone Associations, Town House, Kansas City, Kans., May 19, 20 and 21.

New York State Telephone Association, Mark Twain Hotel, Elmira, May 21 and 22.

North Dakota Telephone Association, Clarence Parker Hotel, Minot, June 2 and 3.

Indiana Telephone Association, Claypool Hotel, Indianapolis, June 4 and 5.

California Independent Telephone Association, Biltmore Hotel, Los Angeles, June 19 and 20.

Washington-Oregon Independent Telephone Association (Joint Convention), Hotel Davenport, Spokane, Wash., June 23 and 24.

Michigan Independent Telephone Association, Olds Hotel, Lansing, Sept. 12.

Arkansas Telephone Association, Arlington Hotel, Hot Springs, Sept. 15 and 16.

Tennessee Telephone Association, Hotel Hermitage, Nashville, Sept. 17 and 18

Rocky Mountain Telephone Association, Newhouse Hotel, Salt Lake City, Utah, Sept. 18 and 19.

United States Independent Telephone Association (annual convention), Conrad Hilton Hotel (formerly the Stevens), Chicago, Oct. 13, 14 and 15.

North Carolina Independent Telephone Association, Carolina Hotel, Pinehurst, Oct. 23 and 24.

Georgia Telephone Association, Henry Grady Hotel, Atlanta, Oct. 27 and 28.

South Carolina Independent Telephone Association, Clemson House, Clemson, Oct. 30 and 31.

Virginia Independent Telephone Association, Roanoke Hotel, Roanoke, Nov. 6 and 7.

Alabama-Mississippi Independent Telephone Association, Jefferson Davis Hotel, Montgomery, Ala., Nov. 10 and 11.

Florida Telephone Association, Orange Court Hotel, Orlando, Nov. 13 and 14.

South Dakota Telephone Association, Cataract Hotel, Sioux Falls, Nov. 13 and 14.

Here's Proof of

3029 Pressure-Creosoted Poles set on New Haven's right-of-way in 1918— 98.7% still in service after 34 years

● In 1918, the New York, New Haven & Hartford Railroad set 3029 yellow pine poles—pressure-treated with Creosote Oil—to carry a communications cable line along its right-of-way in New York and Connecticut. Today, 34 years later, only 41 of these poles have been removed for failure. The other 98.7% are still in service.

The poles have undergone five inspections to date; another is scheduled next year. Each inspection consists of careful visual examination, thorough soundings and test borings where necessary.

The first inspection, in 1933, showed four poles had been removed. By 1941, 10 additional poles were gone; by 1945, four more; by 1948, 12 more, and in 1951, 11 more replacements had been made.

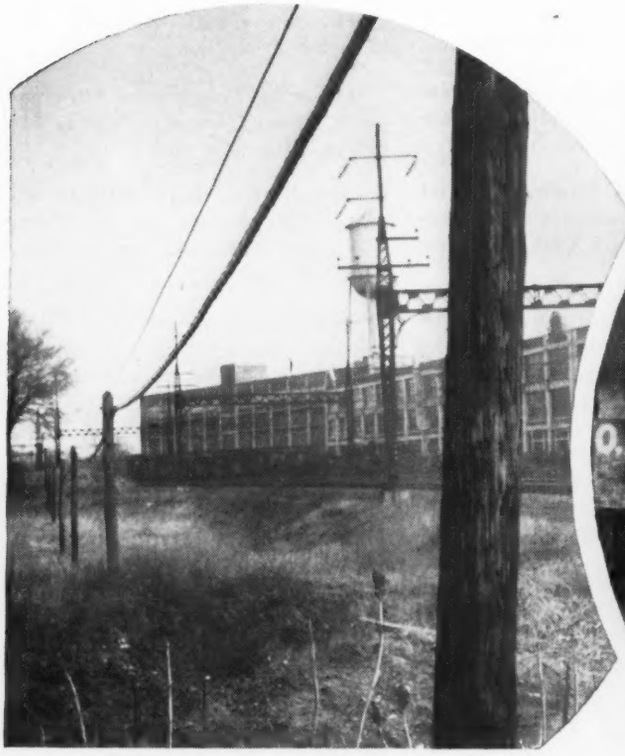
All poles on the line are yellow pine, subjected to the "full-cell" treating process (A. T. & T. specification L-3239) with 12-pound retention.

J. D. Rogers, the New Haven's Superintendent of Communications, says, "We have found that a pole treated with the 'full-cell' process can be expected to stand up without replacement for 25 to 35 years, and possibly for a longer period than that."

Records like these are your best guide when you choose a wood preservative. They are real *proof of performance*. They are the main reason the wood preserving industry used more than 200 million gallons of Creosote Oil preservatives in 1950.

Creosote Oil contains not one, but many compounds whose toxicity and permanence ward off attack by such wood destroyers as termites, fungi, dry rot and marine borers.

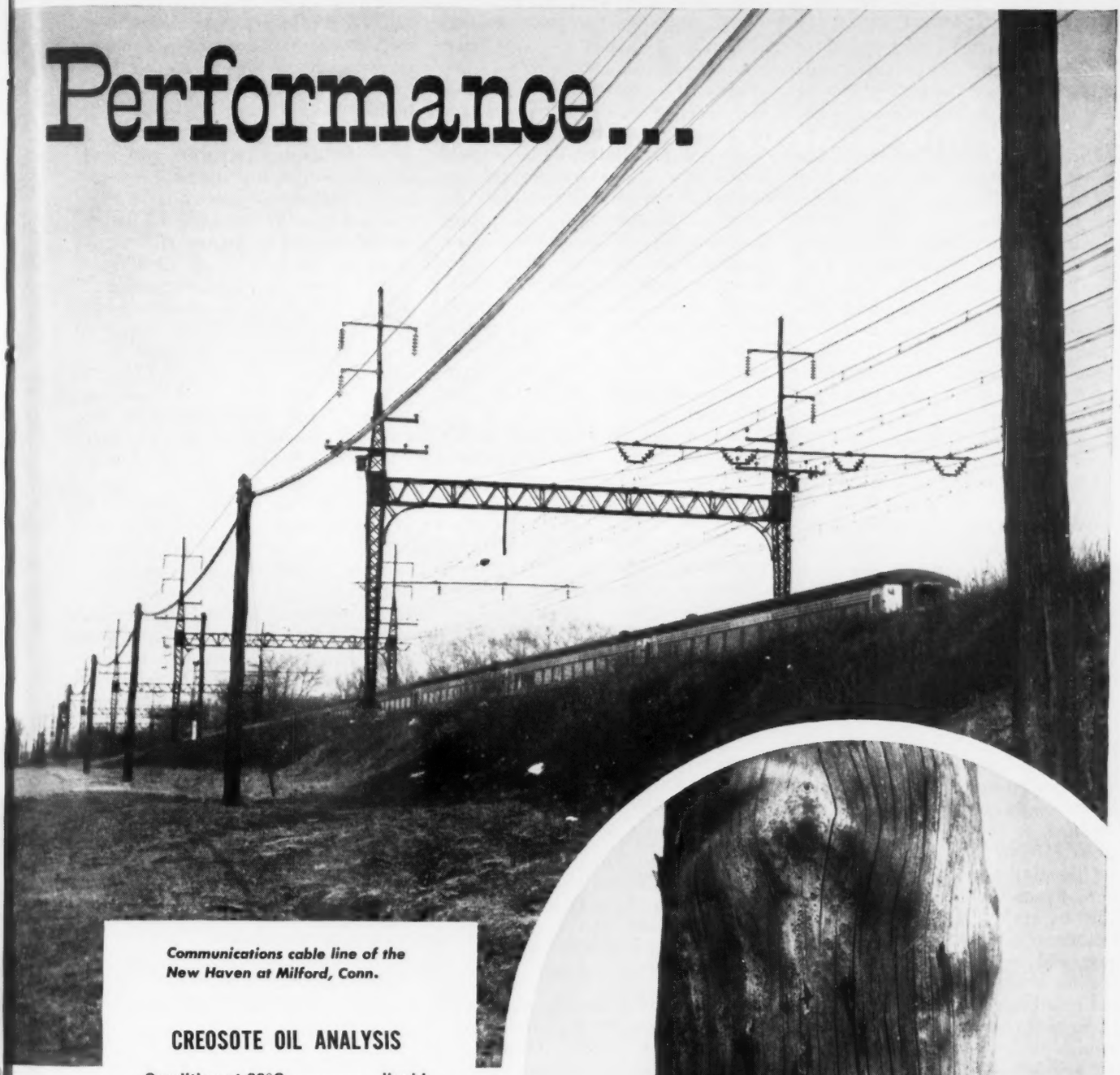
For a uniform product that gives you uniformly good performance, specify U·S·S Creosote Oil. It's the product of *continuous* processing in the world's largest tar distillation plant. For complete information, write United States Steel Company, 525 William Penn Place, Pittsburgh 30, Pennsylvania.



View of the line at West Haven, Conn.

1918 photo shows first of the 3029 poles on the line at West River.

Performance...



Communications cable line of the New Haven at Milford, Conn.

CREOSOTE OIL ANALYSIS

Condition at 38°C.	liquid
Spec. gravity at 38°C.	1.059
Dist. below 200	.842%
Dist. below 210	1.34%
Dist. below 235	14.20%
Residue above 355	25.75%
Water	2.16%
Tarry and suspended	.70%

Close-up of a pole near the East Woodmont Tower.

U·S·S CREOSOTE OIL

USS

UNITED STATES STEEL

vision, staffed with men with a detailed and thorough knowledge of the telephone industry, has again paid dividends for the nation's telephone and other communications companies.

Throughout NPA's existence, the industry has been fortunate in having the men who have served as Directors and Deputy Directors of the division. The first Director, of course, was President L. W. Hill of the Carolina Telephone & Telegraph Co., this year's U. S. Independent Telephone Association chief executive, while his successors have been Vice President Robert E. Williams of the Automatic Electric Co. and Vice President and General Manager William M. Day of the Michigan Bell Telephone Co.

Latest benefit to the industry is a revised version of order M-77, the basic directive covering the communications industry. Although the order had not been formally issued as this column was written, TELECOMMUNICATIONS REPORTS, which acts as Washington correspondent for TELEPHONE ENGINEER, was advised generally of its terms.

Major liberalization of the order is an increase in the size of a project which can be self-certified by communications companies so far as materials are concerned. A single project of up to $25,000 now can be self-certified, as contrasted with the previous $15,000 limit.

Operating communications companies, under the order, thus will be able to apply DO (defense order) ratings to orders for maintenance, repair, and operating supplies, and operating construction materials up to the new limit of $25,000.

Another change brings all construction, with certain limitations, under the provisions of the order. Previously, operating construction was included, and now non-operating construction, such as office buildings, warehouses, garages, and similar structures, are included. This revision means that the Communications Equipment Division, as claimant agency for the industry, will consider construction applications. In the past, other NPA agencies governed non-operating construction.

In addition, leased property is included in the revised order to the extent that the lessee is required by the terms of the lease to procure materials for MRO (maintenance, repair, and operating supplies) and building alterations, provided these alterations do not require an excess of the following controlled materials for any one project in any one quarter:

Five tons of carbon steel, two tons of structural shapes, no wide-flange beam sections or columns, 200 pounds of copper and copper base alloys, 100 pounds of aluminum, and no alloy or stainless steel. Also, no controlled materials will be allowed for decoration or ornamental use.

The revised order affects only domestic communications companies. International communications companies have not been included in the order, it was said, because of the small volume of applications for priority assistance in obtaining class B (general use) products which those companies filed with the Office of International Trade during the last quarter.

In addition, the order does not apply to commercial radio or television networks and amateur radio operators.

The original M-77 order was issued by NPA last July 27. Among other provisions, it has exempted operators of telephone companies with fewer than 5000 stations from controls on their use of MRO materials, and has permitted those companies to self-certify their orders for controlled materials.

Although there is every prospect of a long-range controls program over the supplies of the alloying materials, including nickel, for at least five and possibly 10 years, the nation should be able to remove all restrictions on the use of all three controlled materials—steel, copper, and aluminum—in slightly more than two years, Defense Production Administrator Manly Fleischmann told TELECOMMUNICATIONS REPORTS following his address before the Armed Forces Communications Association convention in Philadelphia.

Mr. Fleischmann, forecasting substantially improved copper supplies in 1954, but no earlier, repeated his earlier assertion that the copper situation still is "very bad," in contrast to some reports that it has been easing. He pointed out, however, that CMP allotments to the communications industry to obtain copper supplies have been increased recently because of "attrition"—the failure of some organizations with allotments to cash their controlled materials plan tickets.

The DPA Administrator conceded that considerable difficulties arose a few months ago because of the oversupply of copper in the hands of brass mills and the relative shortage of the metal in the hands of wire mills. He said, however, that steps have been taken which have helped to rectify the situation.

Mr. Fleischmann said in his address that while the United States is in a position to boost sharply its production of the three major controlled materials, it must look to other sources for major shares of the alloying metals. These include colombium, cobalt, and tungsten, as well as nickel. Should the nation get into all-out war, demands for these metals would rise far above the available stockpiles, he declared, adding that the U. S. could hardly fight a major war for a year if left with only its own production of those materials. The only answer, he emphasized, is substantially accelerated stockpiling, resulting obviously in continuation of strict controls for five to 10 years.

At the AFCA convention, incidentally, Theodore S. Gary, Vice President of the Automatic Electric Co., Associated Telephone & Telegraph Co., and other Gary Group enterprises, was reelected as a member of the Board of Directors, with a term expiring in 1956.—THE END.

"Tid-Bits"

IN CORPUS CHRISTI, TEX., commercial people were somewhat surprised to find they had received a check in payment for a telephone bill which was signed, "*Mrs. Bill Telephone.*"

IN NEW YORK CITY a six-slot toothbrush holder was found on the wall of the telephone booth of the Swiss Pavilion, on east 50th street.

IN IDAHO FALLS, a sailor went through the telephone book and finally selected a name to sign to a bogus check. Later, when local authorities arrested him for forgery, the sailor was told he had chosen none other than the name of the county's prosecuting attorney.

IN ST. LOUIS, MO., a young toll customer was telling the long distance operator that he wanted to make a long distance call. Several times the operator asked the caller to deposit 25-cents. No response. Then she changed her phrase to "Please put in two dimes and one nickel." Still no sign of life. Finally as a last resort, she blurted, "Please deposit two-bits!" The call was completed.

Du Pont AMMATE®

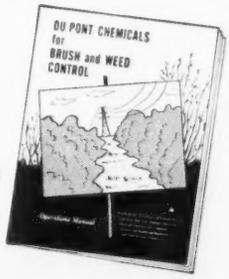
Keeps Brush Down with Fewer Sprays

Many users report lower cost to keep brush down with "Ammate" Weed Killer. Sprays once every five years do the job on their rights-of-way. For "Ammate" kills more kinds of brush, roots and all, than most other brush killers.

You save on labor and equipment with "Ammate." Each spray lasts longer, so maintenance crews can cover more ground. And "Ammate" provides top efficiency in killing brush over more months of the year than most chemicals.

Grass and low growth come back to control erosion, for "Ammate" does not leave soil unproductive. And since "Ammate" is not volatile, there's less danger of spray drift damage.

Get this illustrated booklet *describing industrial brush control with Du Pont "Ammate" and other Du Pont brush and weed killers. Write to Du Pont, Grasselli Chemicals Dept., Wilmington, Delaware.*



New Du Pont 80% CMU

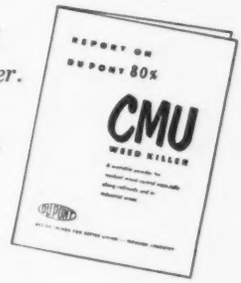
Keeps Ground Bare of Vegetation

Now you can reduce fire and maintenance hazards! New Du Pont 80% CMU Weed Killer destroys grass and broadleaf weeds . . . keeps weed growth out of pole yards, substations, power stations, pumping stations and other outdoor installations. And one application does the job for as long as a year or more.

This effective new chemical weed killer is absorbed by the roots, and gives thorough results. Tests throughout the U.S. and Canada have proved the effectiveness of CMU Weed Killer.

Du Pont CMU has other advantages, too. It is non-volatile, so there's less danger of spray drift damage, and, furthermore, it is non-flammable.

Get this new leaflet *on uses of Du Pont 80% CMU Weed Killer. For details, write to Du Pont, Grasselli Chemicals Department, 5031 Du Pont Building, Wilmington, Delaware.*



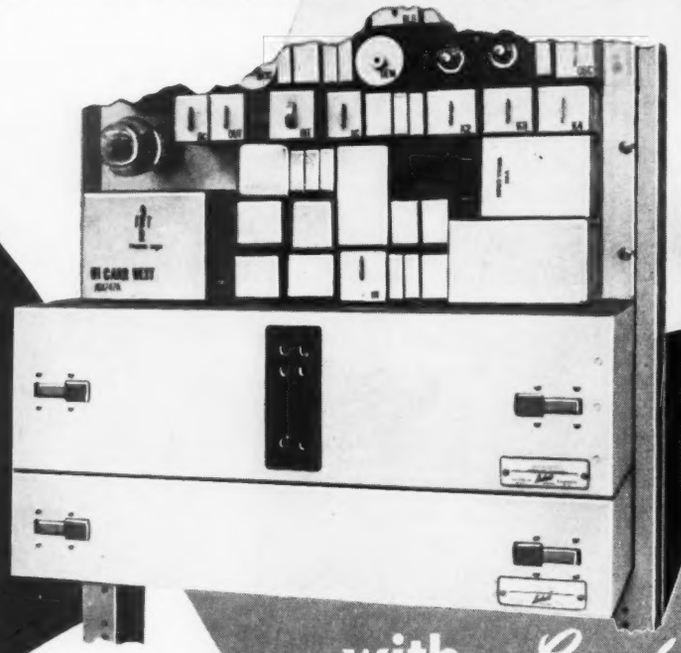
DU PONT
REG. U.S. PAT. OFF.

150th Anniversary

BETTER THINGS FOR BETTER LIVING . . . THROUGH CHEMISTRY

Another First from Automatic Electric —

Add *Automatic Pulsing* to H1 Carrier Systems



with *Lenkurt* TYPE H1-D Dial Signaling System

You can now add automatic (or manual) pulsing facilities to present H1 carrier circuits—and do it quickly and easily, with the new Lenkurt H1-D system! Toll dialing operation will soon pay the nominal cost of the Lenkurt H1-D system.

Using frequencies adjacent to the normal voice channels, Lenkurt H1-D transmits signaling pulses at any standard frequency, to any automatic exchange equipped with suitable terminating or adapter equipment. The two easily installed units—Lenkurt 333A Signaling panel and 595B Filter—are factory-wired, ready to mount on existing rack space; they can be powered directly from the associated H1 carrier terminal or from a Lenkurt 115 v. 60-cycle Power Supply Panel.

Send for your free copy of HID-P10 today!

If your toll circuit needs call for additional carrier channels, investigate the "second-story" and "third-story" channels of Lenkurt Type 33 added to your present single-channel system.

For complete engineering information on the Type HI-D or the Type 33 systems, send us details of your present or proposed circuits.

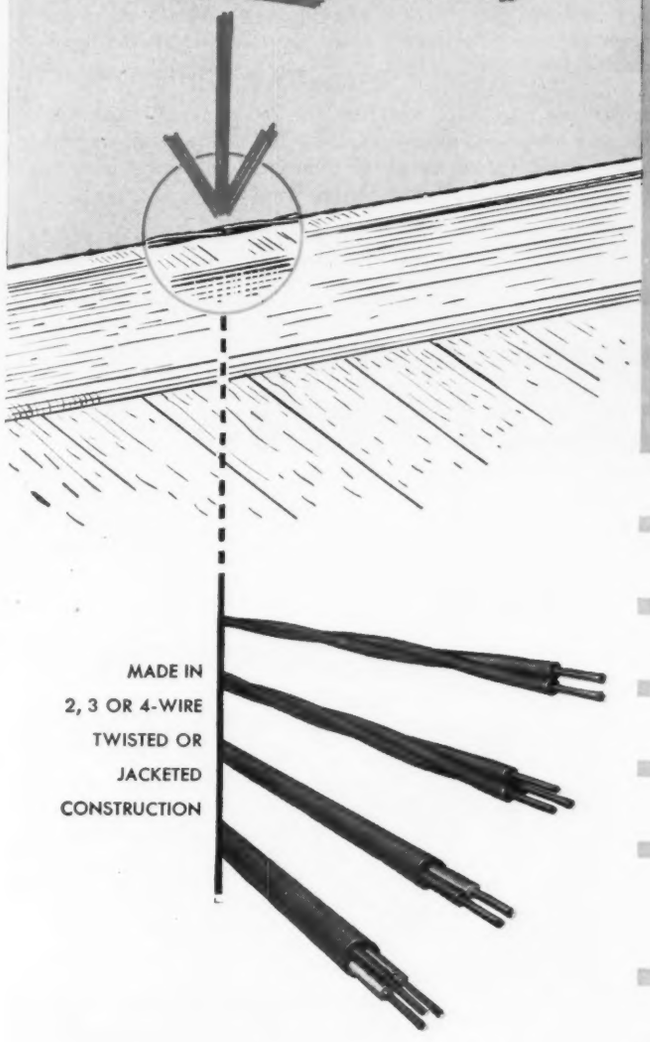
Manufactured for

AUTOMATIC ELECTRIC

Originators and Developers of the Strowger Step-by-Step "Director" for Register-Sender-Translator Operation . . . Machine Switching Automatic Dial Systems
Makers of Telephone, Signaling and Communication Apparatus . . Electrical Engineers, Designers and Consultants

Distributors in U. S. and Possessions: Automatic Electric Sales Corporation
Export Distributors: International Automatic Electric Corporation
1033 West Van Buren Street, Chicago 7, U. S. A.

Save Copper Here, too



MADE IN
2, 3 OR 4-WIRE
TWISTED OR
JACKETED
CONSTRUCTION

...Use **Copperweld**® **INSIDE TELEPHONE WIRE**

Here's another copper-saving product—Copperweld* Inside Telephone Wire—that will give you all the important advantages obtainable from Copperweld Line Wire and Drop Wire—lower cost, greater strength, ample conductivity, and permanence.

By using Copperweld Inside Telephone Wire, your supply of copper goes further—enables you to install more telephones with less copper, despite the copper shortage. Write us today for more information.

*Trade Mark

COSTS LESS

AMPLE CONDUCTIVITY

STRONGER THAN COPPER

NON-RUSTING

PLIABLE—EASY TO INSTALL

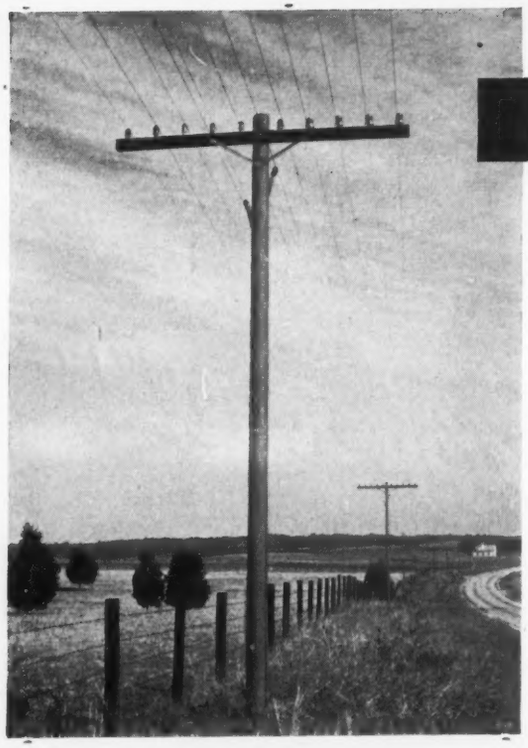
USED BY THE WORLD'S LEADING TELEPHONE SYSTEMS

AND IT SAVES COPPER

COPPERWELD STEEL COMPANY
Glassport, Pa.
SALES OFFICES IN PRINCIPAL CITIES

Copperweld® **INSIDE TELEPHONE WIRE**

SOLD BY LEADING DISTRIBUTORS



MOST DURABLE

Taylor-Colquitt
VAPOR-DRIED POLES

Taylor-Colquitt's exclusive process of drying timber by passing hydrocarbon vapors over it permits more uniform distribution of creosote during the treating process. This deeper and more uniform penetration enables vapor dried poles to retain their preservative longer and thus makes them the most durable available.

Longer life coupled with 20 to 25 per cent greater strength and lower weights makes Taylor-Colquitt poles the outstanding value for all types of overhead line construction. Specify Taylor-Colquitt Vapor Dried Poles.

Taylor-Colquitt Vapor Dried Poles are distributed to independent telephone companies exclusively by Automatic Electric Sales Corporation, 1033 W. Van Buren St., Chicago 7, Illinois.

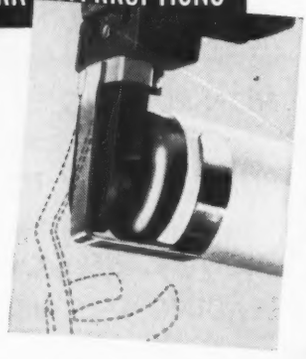
TAYLOR-COLQUITT CO. TIMBER CONSERVATION T-C

TAYLOR - COLQUITT CO.
SPARTANBURG, SOUTH CAROLINA

PLANTS AT SPARTANBURG, SOUTH CAROLINA AND WILMINGTON, NORTH CAROLINA

STOP! INJURIES AND WORK INTERRUPTIONS

from falling fluorescent-tube accidents



Fluorescent tubes sometimes fracture. Vibration and shock may release them from fixtures. Wherever fluorescent lighting is installed there is the possibility of physical injury and property damage resulting from falling tubes.

Don't wait for accidents to happen. For a few cents each you can keep tubes in place, prevent falling, insure against poisoning, contamination and spoilage, avoid injuries, work interruptions and loss of time.

Install Den-El fluorescent lamp guards, easily and quickly, with a screw driver. Permanent, positive protection. Stainless steel. Easily sprung aside for relamping or cleaning. Two guards for each lamp.

Types for all fixtures, also tubes in series

For 40W tubes, per C **$17.00**

For 100W tubes, per C **$20.50**

ORDER TODAY DIRECT

Ask for bulletin, also complete General Scientific catalog of hundreds of other safety equipment items

All orders shipped promptly from Philadelphia

A DEPENDABLE GUIDE G S TO SAFETY

GENERAL SCIENTIFIC EQUIPMENT CO.
2709 W. HUNTINGDON ST., PHILADELPHIA 32, PA.

SAFETY EQUIPMENT FOR EVERY HAZARD

CASE TRANSPOSITION BRACKET

CROSSARM TYPE

For complete information Write for Circular 1251 A

The economical way to transpose

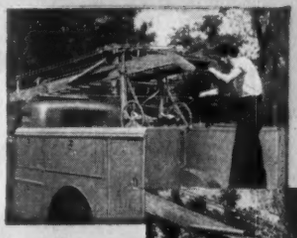
The Case Crossarm Type and Span Type Transposition Brackets have proven to be the most practical method of transposition. Easy tensioning, proper wire spacing and line balancing are all accomplished economically and quickly with this lightweight aluminum bracket.

Revolving insulators on the bracket assure ease of pulling and each insulator is equipped with a rubber bushing which acts as an insulator in case of glass breakage. Tying in the line wires is eliminated and tension in adjacent spans is equalized

BUCKEYE TELEPHONE & SUPPLY CO.
1258 KINNEAR RD. COLUMBUS, OHIO

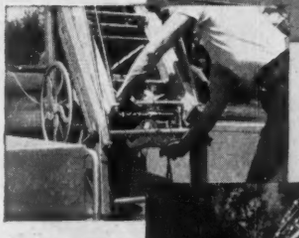
THIRTY FEET HIGH in THIRTY SECONDS

Simple, Easy, One-Man Operation

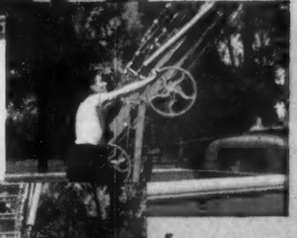


1. Ladder hold-down on cab roof is released.

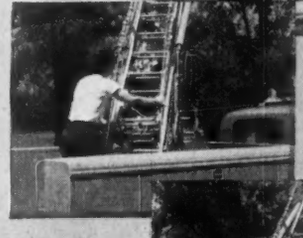
2. Pressure is applied to lower ladder rung.



3. Ladder is locked in elevated position.



4. Upper section is extended to desired height.



5. Ladder is rotated to spotting position.

6. Incline of ladder is adjusted as required.

POWERS *American* SERIES 5510

REVOLVING AERIAL LADDER

Sounds unbelievable . . . but the *Powers-American* Aerial Ladder is so simple, so fast, and so easy to operate that it can be raised to a working position in only 30 seconds—by *one man!* This versatile ladder can be spotted in 40 positions throughout a 360° revolution . . . inclined to any angle from 30 to 75 degrees. Its curved platform falls into position automatically—to provide a level working surface. What's more, this ladder is so safe that it will support *five* times the normal working load. If your operation calls for overhead work, get all the facts on *Powers-American* Aerial Ladders. Mail the coupon NOW for complete information.

POWERS *American* DIVISION

PUBLIC UTILITY BODIES AND EQUIPMENT
McCABE-POWERS AUTO BODY COMPANY
HOME OFFICE: 5900 N. Broadway, St. Louis 15, Mo.
WESTERN OFFICE: Latham Square Building, Oakland 12, Calif.

CLIP THIS COUPON AND ATTACH TO YOUR LETTERHEAD

McCABE-POWERS AUTO BODY COMPANY • 5900 N. Broadway • St. Louis 15, Mo.

Please send me details on the following:

SERIES 5510 REVOLVING AERIAL LADDER ( ) 23' 6" ( ) 26' 6" ( ) 30' 6"

☐ Line Construction Bodies	☐ Wire Reels	☐ _____
☐ General Service Bodies	☐ Pole Trailers	☐ _____
☐ Light Duty Maintenance Bodies	☐ Hydraulic Towers	☐ _____

Name_____

Company_____

Address_____

City_____ Zone_____ State_____

76

Federal DIAL SWITCHING SYSTEMS will meet your conversion requirements

FEDERAL TELEPHONE AND RADIO CORPORATION
An IT&T Associate — Clifton, N. J.

Federal PABX SYSTEMS...for top performance and increased revenues

FEDERAL TELEPHONE AND RADIO CORPORATION
An IT&T Associate — Clifton, N. J.

Federal CARRIER...economically adds extra circuits to existing lines

FEDERAL TELEPHONE AND RADIO CORPORATION
An IT&T Associate — Clifton, N. J.

Federal —A dependable source of supply for quality telephone equipment

FEDERAL TELEPHONE AND RADIO CORPORATION
An IT&T Associate — Clifton, N. J.

The best in TV comes to LATIN AMERICA

...and ISE brings it!

Today's finest television . . . complete stations for Guadalajara and Monterrey, Mexico . . . Sao Paulo, Brazil . . . Buenos Aires, Argentina . . . is being brought to Latin America by International Standard Electric Corporation, an associate of International Telephone and Telegraph Corporation. Whatever Latin America needs for modern telecommunications . . . television, automatic telephone systems, PTM microwave, carrier, railway radio, marine radio, air navigation aids . . . ISE can provide it.

TV Transmitters and Studio Equipment
Microwave Links and Relays
Selenium Rectifiers
Capehart Home Receivers

ISE
an IT&T Associate

International Standard Electric Corporation
67 Broad Street, New York 4, N. Y., U.S.A.

STRANDLINK and STRANDVISE

available in three (3) sizes— for all grades of strand

Field performance over two years now confirms original test claims for this Reliable method of splicing and dead-ending steel strand messenger, static and guy wires.

STRANDLINK

STRANDVISE

ASK FOR

1. Detailed Test Reports
2. Actual Sample For Examination
3. Prices — without obligation

Yes

- ✓ "Installed Costs" go down as guys go up fast, safe and sure. The feed-thru Strandvise, at anchor eye, permits all degrees of tension. Slack guys are tightened in "no time".
- ✓ The greater the load, the tighter they hold. Gripping jaws do not damage the zinc coating of the strand. The Preece Test supports this claim.
- ✓ Shaking and vibrating of even a slack guy does not loosen the grip of the jaws if there was real original tension.

and

Easy speed makes a splice or dead-end with this Reliable method. Most cable spinning machines pass the Strandlink with ease. Some require only that traction rollers be opened.

For ¼", 5/16" and ⅜" strand.

RELIABLE ELECTRIC COMPANY
3145 CARROLL AVENUE
CHICAGO 12, ILLINOIS

Reliable

Telephone Protective and Terminal Equipment for all Station, Line and Central Office Needs.

OVER 45 YEARS SERVICE TO THE TELEPHONE INDUSTRY

Editorial

The High Cost of Telephone Growth

THERE IS A situation in the telephone industry which is becoming more and more difficult to deal with while the public demand for more telephones continues high.

This situation is the tremendous increase in the amount of permanent investment in telephone plant that is necessary in order to add telephones.

This factor of the present-day cost of telephone plant required for the addition of telephones is of great importance to telephone companies. They must make an earning on that investment—and they must raise the money for it.

The per-station investment of telephone companies varies, of course, with companies. It varies with the sizes of the exchanges, the shape of the area served, the type of exchange construction, and so on.

We can get some general ideas on the subject, however, from statistics on all the Class A and Class B Independent telephone companies—that is, all Independent companies with gross revenues of more than $50,000 a year.

At the end of 1945 there were 227 such companies—178 Class A and 49 Class B. The investment in undepreciated telephone plant of all these companies averaged $157 per company-owned station at that time.

At the end of the year 1950—the latest year for which we have the statistics—there were 324 Class A and Class B companies; 256 Class A and 68 Class B. Their average plant investment per company-owned station was $190.

But these figures, while illustrative of what is going on, are so general that they do not tell the whole story.

In order to obtain figures that were somewhat more definite, we made a study of the annual reports of several of the largest Independent telephone companies for the year 1950.

At the beginning of 1950 these companies operated about 922,000 company-owned stations. During the year 1950 they had a net gain of about 80,000 stations—a gain of almost 9%.

And, during 1950, their telephone plant account increased by $417 per company-owned station gained!

No doubt some of this increase of telephone plant was for toll purposes, and no doubt some of it would have been necessary even if these companies had made no substantial net gain in telephones.

But, after making what seemed to us to be reasonable allowances for such things, the indications are that these companies invested somewhere in the neighborhood of $400 per company-owned telephone added in 1950.

There is nothing that we know of to indicate that the cost of adding telephones will be any less in the foreseeable future.

A situation of this kind is, we think, of grave importance to the telephone industry.

It involves, among other things, the necessity for obtaining a great deal more permanent capital for the business than was necessary for a like amount of growth a few years ago.

It necessitates a higher exchange net revenue, in order to pay the additional interest or dividends on the higher amount of capital required.

And there must also be taken into consideration the fact that the telephone company takes all the risk—it supplies everything to the subscriber, from the telephone and wiring on his premises to the central office equipment necessary for supplying his service. The company takes the risk of the subscriber retaining his telephone long enough to justify the investment made for supplying the service to him.

These factors were of importance to the telephone company even back in those days when a telephone could be added for $150 or thereabouts. Now that the investment necessary is more than double that, these factors become much more important.

They are certainly factors no regulatory commission can ignore in fixing telephone exchange rates.

(The foregoing editorial, although copyrighted, may be reproduced in whole or in part, without charge, provided credit is given this publication and a copy of such reproduction is filed with this publication. This legend need not appear on the reproduction.)

All the flexibility and dependability of **XY**

Now available in 3 standard types for private Dial Branch Exchanges

The acceptance and ever-growing selection of the XY System for Central Office use is now known all over America—since no technique of dial-switching has enjoyed such a "trend" as has XY, these past few years.

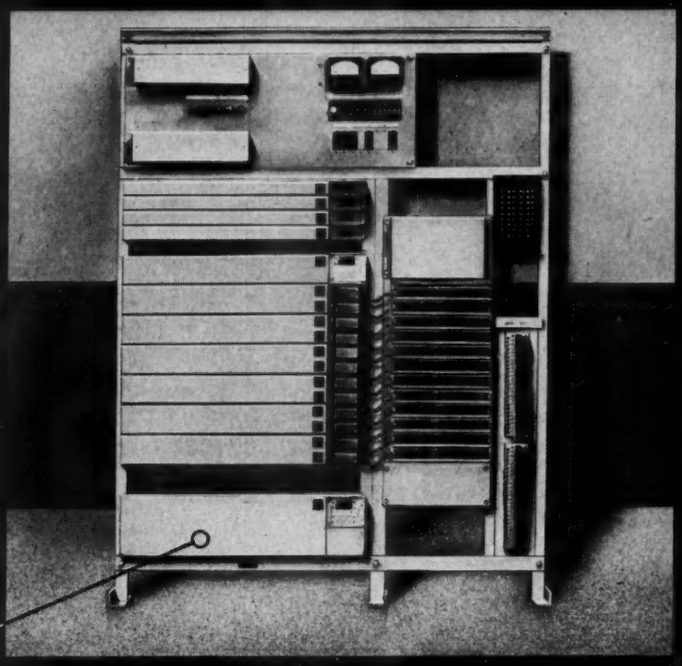
Stromberg-Carlson now offers to operating companies their choice of three XY Systems for Private Branch Exchanges. The advantages of such service are numerous—and three seem to merit special emphasis:

1. Companies already using XY service in their CDO equipment will be using the same switches in PBX installations.
2. Companies not presently employing XY will find that these PBX systems offer increased revenue . . . and at the *lowest maintenance cost* possible.
3. Addition of lines to original installations, up to ultimate capacity, may be made quickly, easily and at very modest cost.

Your further inquiries will be welcomed.

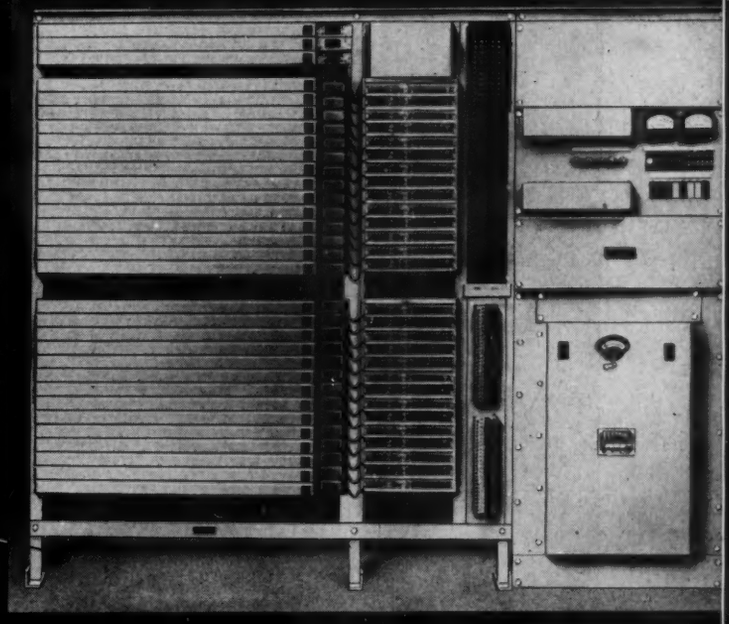
STROMBERG-CARLSON

FACTORY, GENERAL OFFICES: ROCHESTER 3, N. Y., BRANCH OFFICES: ATLANTA 3, CHICAGO 6
KANSAS CITY 8, SAN FRANCISCO 3. IN CANADA: STROMBERG-CARLSON CO. LTD., TORONTO



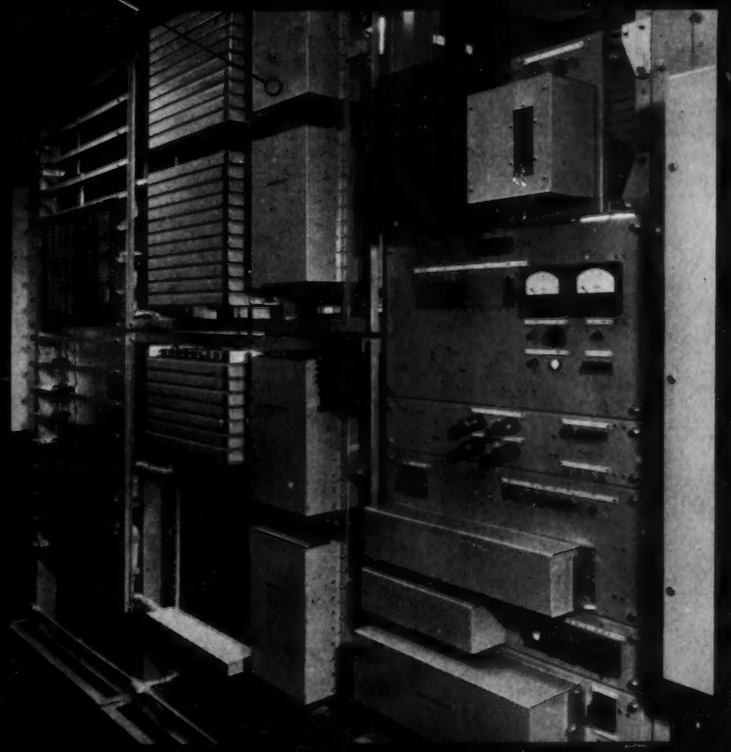
"F-40" XY-PBX

Ideal for the small office or factory. A single-party Finder-Connector system. Ultimate capacity: 40 Lines, 6 Links, 4 Central Office Trunks, 4 Information Trunks.



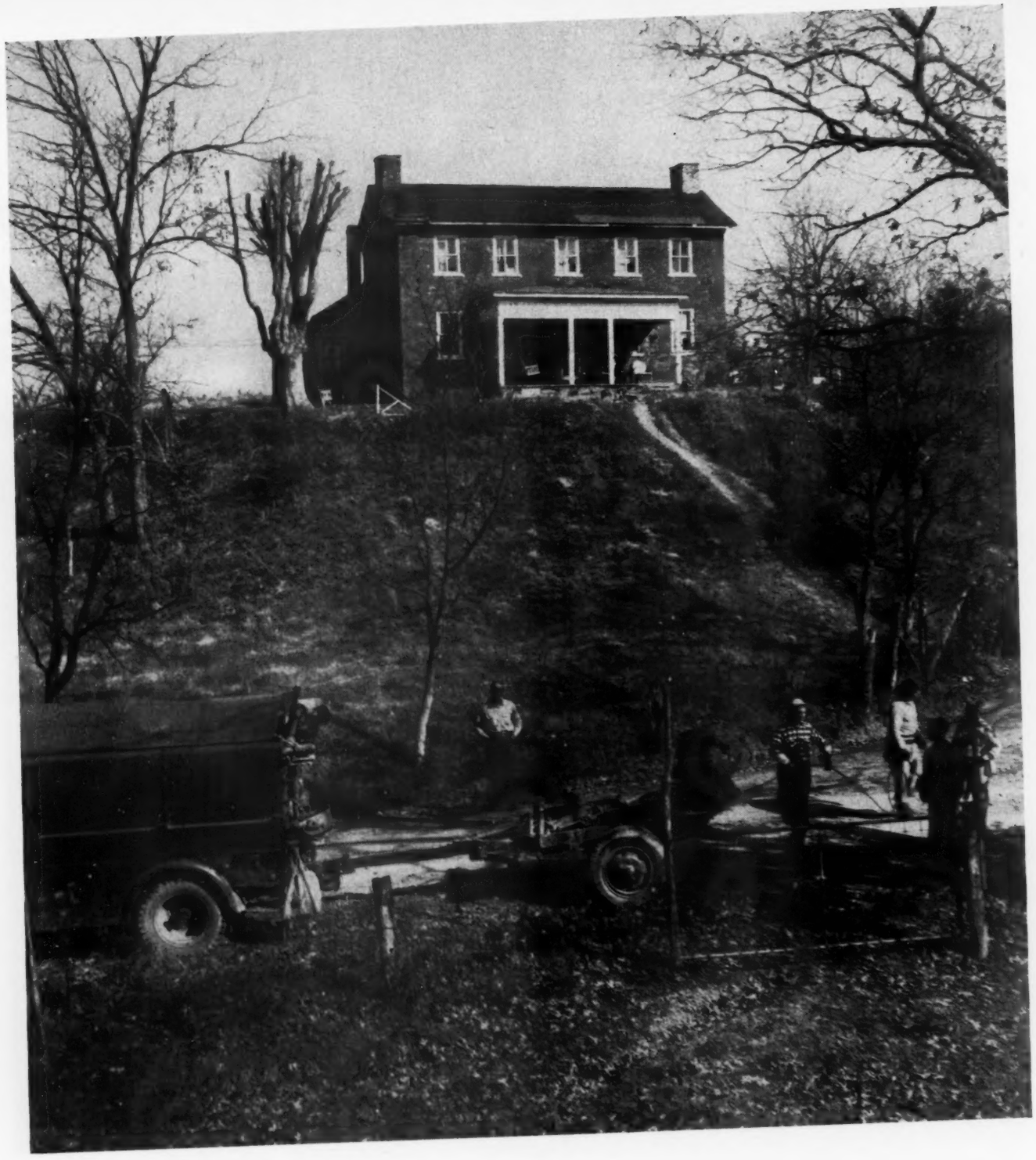
"F-80" XY-PBX

For medium-sized businesses; a single-party Finder-Connector system. Ultimate capacity: 80 Lines, 14 Links, 9 Central Office Trunks, 4 Information Trunks.



"TYPE H" XY-PBX

For the largest offices or plants—single or two-party Finder-Selector system of factory-wired shelf units, as used in XY-CDO and MCO installations. Ultimate capacity limited only by available floor space.



NEW CONSTRUCT

"The combination of new needs to be satisfied and new ways to meet them set the stage for an impressive output of new communication developments."

(Part I of this article appeared in the April, 1952, issue of TELEPHONE ENGINEER & MANAGEMENT.)

THIS TOOL also can successfully be used to staple ground wire in inside locations as when running wire from the protector ground post to the connection on a water pipe. Ground wire is very difficult to properly fasten to fir joists with poultry wire staples as any installer will attest.

When interior wire is to be spliced, the usual practice has been to employ narrow strips of friction tape to insulate the splices. A new method that promises to save considerable time and effort and produce a very neat appearing splice uses special insulated splicing sleeves (Plasti-Grip connectors) illustrated in *Figure* 16. The connector shown is a recently developed type designed to fit standard #22 gauge twisted plastic insulated wire. The connector joins the two ends of the plastic insulated wire, requiring only the use of the special crimping tool illustrated in *Figure* 17. Only two crimps are needed to permanently splice each conductor. This action compresses the metal sleeve inside the plastic cylinder and at the same time pinches the cylinder ends down over the insulation. This provides a very satisfactory insulated splice without the need for using separate metal sleeves which are afterwards wrapped with tape.

For the sheathed type of inside wire, it has been suggested that a plastic sleeve be provided to fit over the splices and exposed conductors. This plastic sleeve could be slipped over one of the two sheathed wires to be spliced together. The conductors would be spliced with insulated or bare metal sleeves pressed in place, after which the plastic sleeve would be pushed over the exposed portion of the sheathed wire to cover the splices. This also would effectively conceal the colored conductors and make the joint inconspicuous. This idea is illustrated in *Figure* 18.

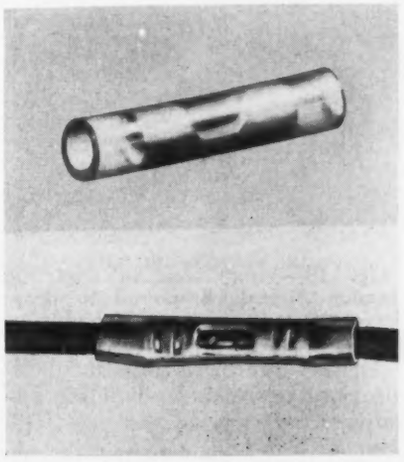


Fig. 16—Aircraft-Marine Products, Inc. Plasti-Grip parallel connectors for twisted pair or triple plastic inside wire. Top: Plasti-Grip connector showing metal sleeve inside plastic cylinder. Bottom: Plasti-Grip connector used to splice conductor ends.

Airseal Compound As A Corrosion Stopper

IN THE MAKING of splices and taps in a telephone circuit it is very essential to have the wires at the connection clean and bright. Otherwise, noise and poor transmission will result from the presence of oxides and sulphates in the joint which act as partial insulators. It is not sufficient just to have the connections thoroughly clean. They must be kept that way, inasmuch as corrosion products are being continuously formed on exposure of the metal to moisture, oxygen, and chemicals in the air.

Joints in insulated conductors are protected by wrapping insulating tape around them to exclude air and moisture. In the case of open-wire conductors, use is made of compression or rolled sleeves in straight and tap styles to form air and moisture tight joints.

When tap connectors, however, are employed for connecting open-wire spurs and drops to the main open-wire line in order to provide for opening the line as required for test purposes, it is difficult to keep moisture out of the connection. If exposure conditions are severe, corrosion will set in. Even if no trouble results from this corrosion, the tap connectors would be inconvenient to reuse and the troubleman would be inclined to replace them with new connectors rather than use them again or turn them in for reconditioning. Sometimes a reused corroded connector will cause line noise or poor transmission unless care is taken to see that the unexposed bright parts are brought into contact with the wires at the connection.

The Kearney Airseal compound was recently developed for insulating and sealing tap connectors on power lines to prevent power losses and line "burn downs" due to joint resistances. This compound should be

Fig. 17—Using special crimping tool to attach Plasti-Grip connector to plastic insulated conductor being spliced.

...ON METHODS

by John S. Reed

the answer to the problem of corroded tap connectors on telephone open wire lines. It is a permanently plastic corrosion inhibitor and sealant that can be formed to any shape or size of fitting. It is impervious to the action of salt spray and even very corrosive agents such as nitric and sulphuric acids. This compound does not attract insects or rodents as it does not contain vegetable or natural oils.

When Airseal compound is applied to a tap connection as shown in *Figures* 19 *and* 20, it forms a hermetic seal that keeps the connection permanently clean and bright. The plasticity of the compound is not affected by freezing or heat, and it can be removed and used over again a number of times. This feature makes the compound very advantageous for use on tap connectors that must be removed and reused frequently for line tests.

The compound is applied by kneading it over the connection to obtain a complete seal. It is easily removed merely by peeling it off. It will not stick to hands or gloves.

With the Airseal compound as a sealant, there need be little concern about the effect of dissimilar metals at the tap connection. Because the compound keeps out moisture effectively, there will be no galvanic action between unlike metals and it should be possible to use copper connectors on copper to galvanized steel line wire connections.

The plastic sealant has other uses, too. It can be used on connections of ground leads to ground rods to prevent corrosion of the uninsulated metal buried in the ground. Failures of central office grounds occur at the wire connection, and, if this connection can be adequately protected, long life of the ground should be assured, especially when insulated wire is used for the ground lead. The compound can also be employed as terminal stub and gasket seals, and its use has been suggested for sealing cuts and cracks in cable sheath.

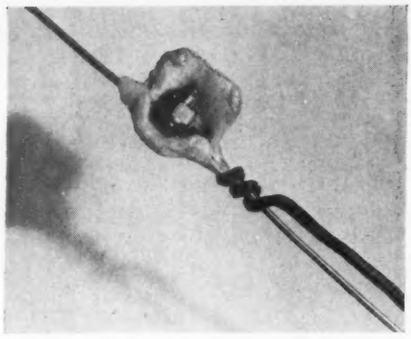


Fig. 19—First stage in applying Kearney Airseal compound to drop wire connected to open-wire conductor with tap connector.

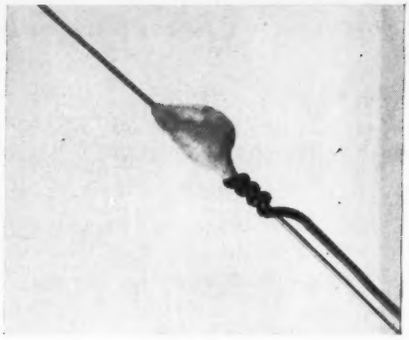


Fig. 20—Appearance of drop wire connection protected with Kearney airseal compound.

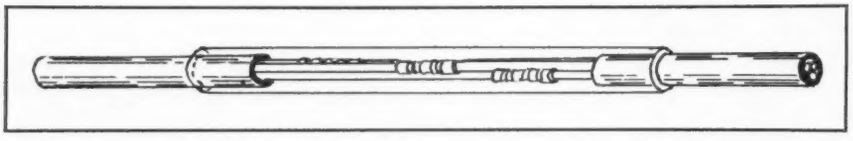


Fig. 18—Phantom view of plastic sleeve suggested for covering splices and exposed conductors of plastic sheathed inside wire.

Salvaging Drop Wire and Line Wire

IT IS POSSIBLE to recover and recondition wire that is removed in station disconnections and outside plant repair and rebuilding operations.

When a sufficient amount of salvaged wire has accumulated in the storeroom to make the recovery operation worthwhile, the lengths of wire are sorted as to the kind and condition. All wire considered unfit for use is sold to junk dealers for delivery to smelting plants for recovery of scarce metals. Wire that is judged to be in good condition is set aside for any necessary repairs and to be put up in coils.

In salvaging drop wire, short pieces of the same kind and construction are spliced together. Compression sleeves and plastic tape can be used to good advantage to produce neat and relatively inconspicuous splices. All kinks and worn or damaged spots should be cut and the wire respliced at these locations.

In selecting sections of steel line wire for reuse, all pieces that show rust should be discarded since, once rusting has started, the wire will rapidly deteriorate. Wire with black galvanizing is still good for many more years of service. Short pieces, generally not less than 25 feet long should be spliced with longer sections, and kinked and nicked places in the wire should be cut out. Compression sleeves make neat splices that are stronger than the wire itself and will last indefinitely.

When considerable quantities of wire are to be sorted for stocking, the payout and take up reel assembly shown in *Figure* 21 is a very handy method of reeling the wire into convenient coils. As the wire is reeled, it can be inspected and repaired and short sections spliced together without tangling. When it is desired to measure the wire for inventory purposes, the measuring wheel and meter illustrated will be found to be convenient and accurate.

When copper wire is removed, it should be wrapped with protecting paper tape to prevent scratches and dents which would weaken the wire. Steel line wire and drop wire need only be tied with tube rope. Four ties per coil should be used and each

(*Please turn to page* 67)

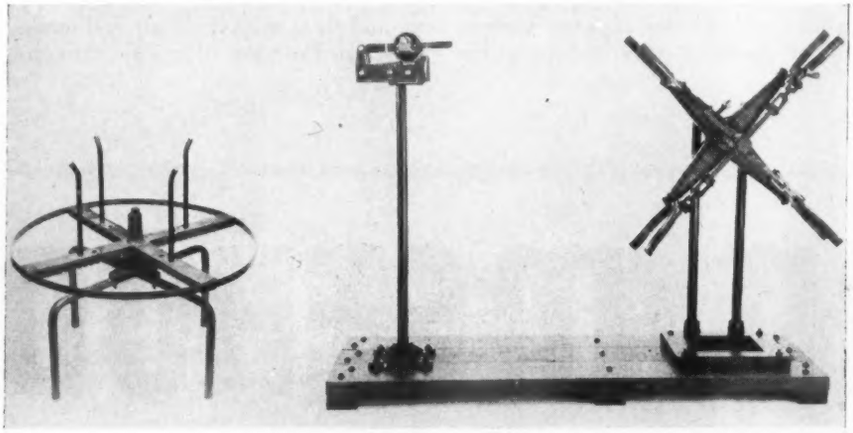


Fig. 21—Neal Company No. 1200 coiling machine for coiling and measuring drop wire and line wire.

Measuring The Coupling Between Contiguous Telephone Circuits

This article describes the development and use of a means of making crosstalk comparisons by visual means believed to be practical for adoption in any telephone system.

By
Jefferson Clark Davis

Introduction

THE SEVERAL uses of the cathode-ray oscillograph for testing telephone circuits as described in this paper are the result of a search for an accurate method of measuring crosstalk coupling. Since the use of the oscillograph as a crosstalk meter is the greater need, and since the other uses are applications of the first development, most of this paper will be applied to the subject of crosstalk measurement.

The locating of shorts, opens, and grounds on communication circuits is usually accomplished by measuring resistance with a wheatstone bridge. However, crosstalk coupling and transmission losses are power changes; therefore an instrument for accurately measuring this power transmission is required.

The most common methods of measuring crosstalk coupling are by ear balance. In these methods inaccuracies are quite prevalent because of differences in frequency-response, characteristics of the observers' ears, and in their judgment. Even with the best of equipment these methods are slow and tedious, and errors are sure to occur. To remedy these difficulties, the crosstalk meter described in this paper was designed.

Crosstalk between communication circuits is normally of two kinds; intelligible and babble. Intelligible crosstalk is generally between two circuits, whereas babble is the result of a number of circuits crosstalking into one circuit. A third effect similar to those defined above is known as noise. This is caused by the transfer from other electrical sources of current of other than voice frequency. Crosstalk increases rapidly with frequency. The latest types of carrier systems have reached an upper frequency of 60,000 cycles. For such frequencies as these, methods of control are required different from those for lower frequencies.

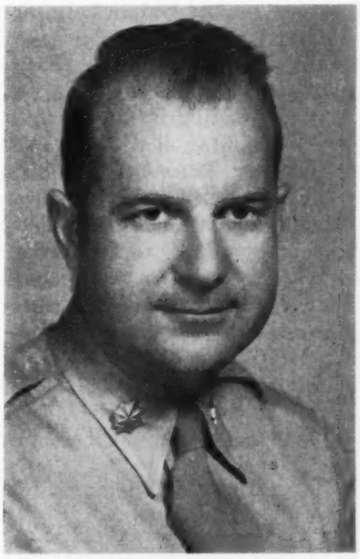
Crosstalk may also be described as near-end and far-end. Near-end is that crosstalk which can be heard at the same end of the circuit as the speaker; far-end is that heard at the distant end.

This crosstalk is not only annoying to persons using the system, but, where sufficiently intelligible, secrecy also is endangered.

Crosstalk is largely confined to terminal equipment, open wire, and the pairs of a single cable. With modern lead covered cables, the coupling between two or more cables is sufficiently small even though the cables are in close proximity. However, when two unshielded circuits are brought into close proximity there is a transfer of some energy from the powered circuit to the other. This energy transfer is of two kinds: electromagnetic and electrostatic. Electromagnetic crosstalk is that caused by the magnetic field formed by current flowing in the talking circuit cutting the wires of the affected circuit unequally, thereby setting up an induced electromotive force in one wire greater than that in the other. This tends to cause a current to flow in the second circuit. Electrostatic crosstalk is that caused by an unequal capacity effect between the wires of adjacent circuits. When a current is flowing in the talking circuit, the difference in potential between the wires will cause small resultant currents to flow through the various "condenser connections" to the second circuit.

An additional effect which is probably not so well known is the proximity effect. This is best explained by recalling that if two conductors of a circuit are widely separated, the current distribution in either wire is symmetrical with respect to its center, the density being greatest at the surface and decreasing toward the center. If these conductors are brought close together, the current in each conductor is unsymmetrical with respect to the other. This lack of uniformity increases with frequency and has an important effect on the crosstalk between communication circuits. From these conditions it is readily seen that this particular effect is greater in cable than in open-wire circuits, and greater for high-frequency carrier systems than for voice-frequency communication.

To determine if objectionable crosstalk exists it is necessary to have a suitable method of measuring the coupling.—(*Turn page please*)



JEFFERSON CLARK DAVIS

A native of New Bern, N. C., Mr. Davis graduated from North Carolina State College with the degree of B.S. in Electrical Engineering and later while employed in Hawaii earned the degree of M.S. in Physics at the University of Hawaii. He was awarded the degree of Electrical Engineer by N. C. State College. Upon graduation from college he was employed by the Southern Bell Telephone & Telegraph Co. He later accepted civilian employment with the Signal Corps, U. S. Army, and advanced through several positions to Telephone Equipment Engineer. A Reserve Officer, he was ordered to active duty with the Signal Corps shortly after Pearl Harbor. He was retired for physical disability as a Major and received a terminal promotion to Lieutenant Colonel.

The first method of testing was to have one person talk over one of two lines suspected of crosstalk while another person listened on the second line. The listener judged whether the crosstalk was sufficiently great to warrant investigation. This test rested upon the judgment of the listener. Later, a method of graded criteria for the loudness of the crosstalk was adopted. This ranged over six grades from "crosstalk completely inaudible" to "crosstalk so loud as to admit of intelligible conversation". The results through this method of testing rested upon the listener's hearing, the talker's voice, and the noise level in the room where the receiver was located.

In view of the obvious inaccuracies of such a system, several methods of testing have been developed which incorporate a standard of comparison. Most of these systems depend upon a balance by ear between loudness of the crosstalk and loudness through a standard. These methods still are dependent upon the judgment of a listener and the frequency response of various observers' ears. Information has been published by the Bell Telephone Laboratories concerning crosstalk measurements using a noise measuring unit as a visual indicating meter and a warbler type oscillator with a frequency output between 670 and 1650 cycles.

This paper describes the development and use of a means of making crosstalk comparisons by visual means believed to be practical for adoption in any telephone system. Visual methods are much less susceptible to error than aural methods.

While this method makes it possible to measure crosstalk between circuits against a fixed and constant standard, it must be remembered that this standard must be based upon the judgment of an individual or group as to what constitutes objectionable crosstalk or endangers secrecy for the particular type of circuit measured.

Crosstalk coupling measurements are made both on a new plant at the time of installation and on an old plant, to localize and clear specific troubles. For this test, two circuits have to be taken from service at a time.

Crosstalk volume measurements are also made on working circuits as a check of crosstalk performance. Since this check can be made at peak loads without removing circuits from service, it is used a great deal as a routine check. When this check indicates an excessive volume of crosstalk, the crosstalk coupling measurement can be made to determine the magnitude and location of the crosstalk.

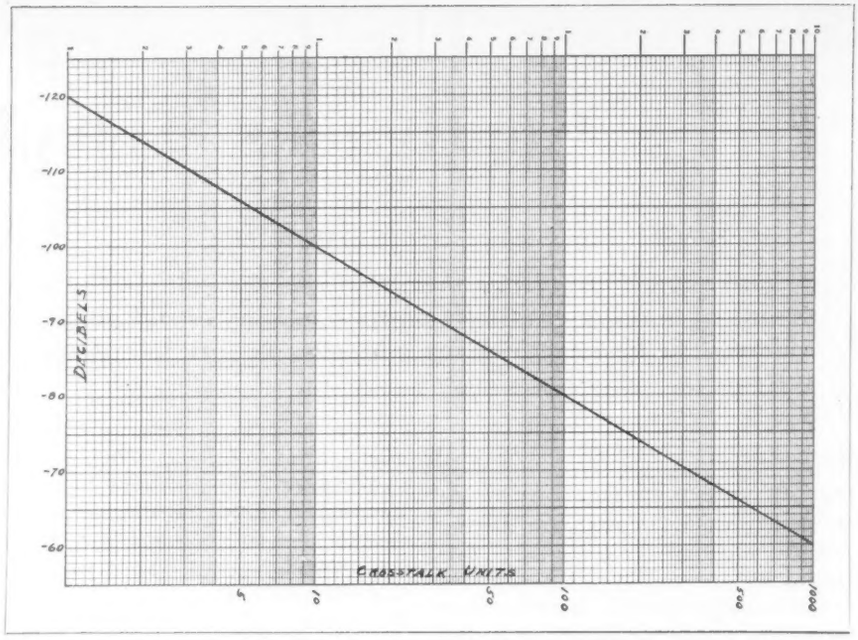


Fig. 1—Relationship Between Crosstalk Units and db Down of the Crosstalk Coupling.

The usual measure of the coupling effect between two circuits is the ratio of current at the output terminal of the disturbed circuit to the current at the input terminal of the disturbing circuit. This ratio is usually so small that it is ordinarily multiplied by 1,000,000 and called the crosstalk coupling, or "crosstalk". Crosstalk may also be measured or expressed as the transmission loss in decibels (db) corresponding to the current ratio.

Two amounts of power differ by one decibel when they are in the ratio of $10^{0.1}$; and any two amounts of power differ by N decibels when they are in the ratio of $10^{(0.1)N}$. That is, the change in decibels equals $10 \log_{10} \frac{\text{Output}}{\text{Input}}$. The relation between crosstalk units and db loss is shown in *Figure* 1.

Permissible crosstalk coupling limits are generally made dependent on the chance of intelligible crosstalk occurring. This chance depends upon a number of variable conditions, such as the frequency of the transmission and the type of the circuit. Therefore the limit for a particular circuit is determined by the existing conditions. Hence, the criteria previously mentioned are dependent upon the conditions and the individual or group for which they are determined. However, for voice-frequency transmission a loss of 30 db is considered a maximum for satisfactory intelligibility. This is a ratio of power output to input of .001. With a loss of 50 to 60 db (power ratio of .000,01 to .000,001), transmission of speech would hardly be possible. Similarly, a maximum crosstalk coupling of 50 to 60 db could hardly be objectionable under normal conditions. Under more severe conditions, a coupling of as little as -75 db is required.

The measurement of transmission loss through a circuit does not involve such small power ratios, and therefore does not present as difficult a problem. In this instance, the power ratio is the output (or receiver end) to the input (or transmitter end) of a communication circuit. This paper will develop a method of measuring the small power ratio of crosstalk coupling between circuits, and then adapt this method to measuring the larger power ratios of transmission loss.

Equipment Used

INSOFAR AS practicable, commercial equipment was used and applied to the power-measuring problems.

Essentially, the equipment consists of a source of high-frequency alternating current, an attenuator, and a visual means of measuring current. This equipment and the method of wiring are shown in *Figure* 2.

For a variable source of high-frequency alternating current, an oscillator (Wireless Egert Engineering, Inc., Type No. 317) was used. In order to step up the output sufficiently to cause a transfer of energy between two circuits of low coupling for crosstalk measuring, an eighteen-watt amplifier was introduced into the circuit.

For measuring the current which was transmitted, a Cathode Ray Oscillograph (R.C.A. Mfg. Co., Inc., Type

TMV-122-B) was used. Only the vertical sweep was needed. To measure the amplitude of the sweep, a transparent scale was applied over the end of the tube. For convenience it was scaled to one millimeter divisions.

The attenuator-and-switch box was designed to furnish all necessary connections by connecting directly to all of the other equipment used. In addition to the necessary terminals it contains a four-pole double-throw switch for transferring the oscillator and oscillograph between the circuits being tested and the attenuator proper. The wiring diagram is shown in *Figure* 3. *Figure* 3 shows also the circuit used for an attenuator. The variable resistance was external to the box. A double-pole double-throw switch was used for cutting the fixed resistors in or out of the circuit, as required. High-quality resistors must be employed to allow the use of the attenuator over a wide range of frequencies. A curve showing the relation between the variable resistance and the db loss is given in *Figure* 4.

A number of circuits and combinations of equipment were tried before that described above was adopted. One method for comparing oscillograph deflections caused by current received through an attenuator with that received from circuits under test, and which seemed to have some promise, was to apply one current to the vertical sweep and the other to the horizontal sweep. This plan would require two high-frequency power sources of exactly the same frequency, wave form, and magnitude; besides, its accuracy is not comparable to that of the method finally used. The attenuator-switch box was developed in order to combine the required switches and connections into one instrument.

Method of Crosstalk Measuring

IN ORDER TO make the desired crosstalk measurements, the equipment is set up as shown in *Figure* 2.

With the input circuit open, the oscillograph is adjusted and the diameter of the "spot" noted or adjusted to a convenient size.

All connections are made, and the leads are connected to the two pairs between which it is desired to measure the coupling.

The oscillograph, when connected to the telephone circuit, will then register a deflection due to induction from other pairs and external power circuits. The value of this deflection is recorded.

The power is cut on for the oscillator and the oscillator adjusted to the desired frequency, after which the power to the amplifier is *cut* on. With

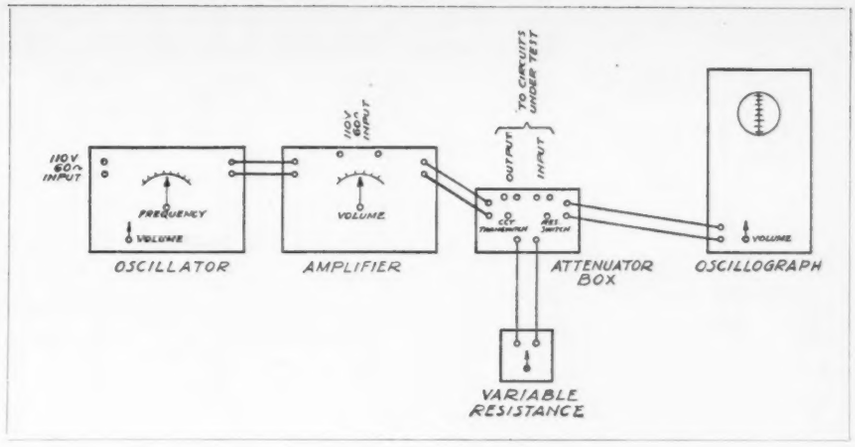


Fig. 2—Hookup Of Equipment.

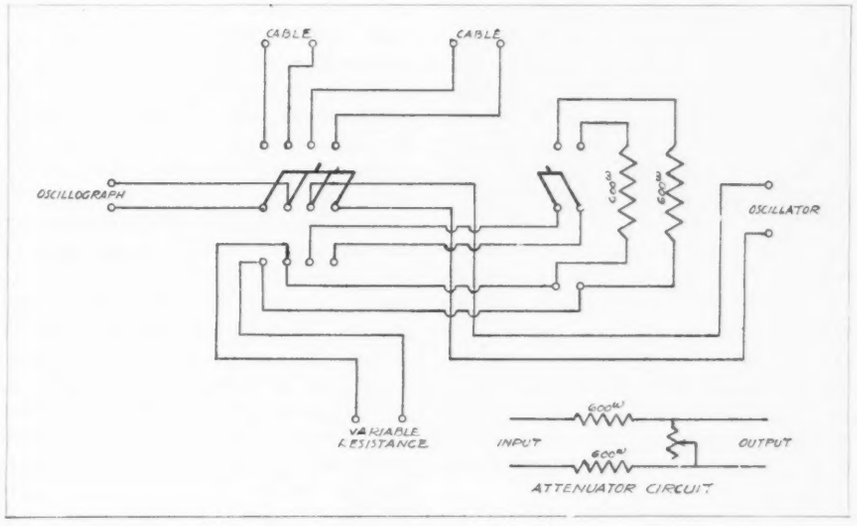


Fig. 3—Attenuator and Switch-Box Wiring Diagram.

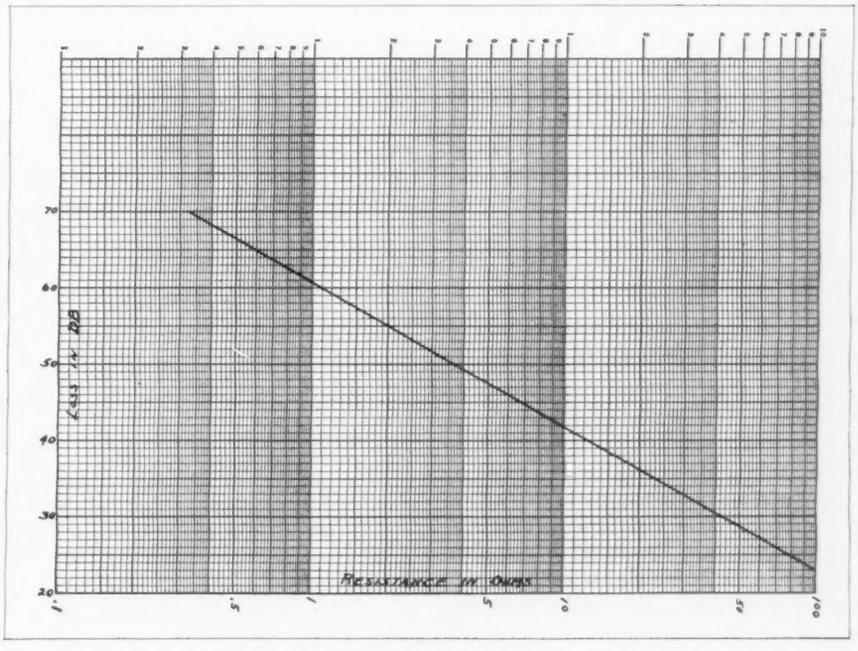


Fig. 4—The Relation Between Attenuator Readings in ohms and the Loss in db (600 ohm resistors in the circuit).

Table I.—Typical Results Indicating The Various Readings Required

Cable Number	Output Pair	Input Pair	Induction Deflection	Powered Deflection	Deflection due to Coupling	Resistance in ohms to give same Deflection	db Equivalent	Crosstalk Unit Equivalent
1	10	30	13	16	3	.7	63.5	670
	27	10	11	13	2	.5	66	500
		29	11	18	7	2.2	54	2000
	29	10	10	11	1	.1	75	180
		23	5.5	7	1.5	.4	68	400
		27	10	14	4	1.3	59	1150
2	67	68	7	9	2	.4	68	400
		69	7	11	4	1.0	60.5	950
		70	7	11	4	1.0	60.5	950
		71	7	9	2	.4	68.0	400
		72	7.5	11.5	4	1.0	60.5	950
		73	8	9	1	.2	74	200
	68	67	9	13	4	1.4	58	1300
		69	8	12	4	1.4	58	1300
		70	8	10	2	.8	62.5	760

the transfer switch *cut* to the telephone circuit as above, the deflection will increase due to the power applied to the other of the two pairs. This increase in deflection, the important quantity, is found by subtracting the first deflection from the second.

The transfer switch is then *cut* to the attenuator circuit and the variable resistance adjusted until the deflection is equal to the increase in deflection when power is transmitted over one of the circuits being tested plus the diameter of the original "spot". The spot diameter is added as a correction since the deflection is not great and the spot was excluded in the measurement of the deflection caused by the power over the circuits being tested.

The resistance in the variable resistor is noted. This attenuator reading is a measurement of the coupling and, by reference to *Figure* 4, may be translated to db coupling. This db coupling may in turn be translated to crosstalk units if desired by referring to Figure 1.

A convenient form for registering the measurements and later translating the readings to db or crosstalk units is shown in *Table I*. For convenience, and to obviate the necessity for recording it, the oscillograph "spot" could always be adjusted to a diameter of one millimeter.

Some Results and Conclusions on Crosstalk Measuring

THIS PAPER does not attempt to present a study of crosstalk between various circuits under various conditions. However, to demonstrate the suitability of the cathode-ray oscillograph as an instrument for measuring crosstalk coupling, a comparison of results obtained with the equipment described and results normally expected through other studies will be given.

Since the particular oscillator used in these tests gives a steady frequency, rather than those of the warbler type, all measurements, except as otherwise indicated, were taken at 1000 cycles as being the most representative frequency of the voice range.

To determine the cables and the particular pairs in the cables which had sufficient crosstalk coupling to come within the range of the testing apparatus, all cables terminated at the point at which the tests were being conducted were sampled by measuring the coupling between a number of pairs taken at random. Inasmuch as it was impracticable to release pairs in service for test, pairs which were in use do not appear in the results given. A few of the typical results obtained while measuring the coupling between circuits in the five available cables are shown in *Table I*, which is a satisfactory form for recording and tabulating results. Circuits having a large crosstalk coupling were used for subsequent tests inasmuch as these could be expected to give the most easily interpreted results.

It will be noted in *Table I* that the same difference in deflection does not always result in the same coupling measurement. This lack of uniform deflection is due to the difference in the power output of the oscillator and amplifier or in the oscillograph amplifier at the time of the measurement. The important detail is to measure each coupling deflection with the attenuator without changing the degree of amplification of any instrument, and to take both measurements while the source of power is approximately constant.

To compare actual crosstalk with the measurements made, a group of circuits showing crosstalk tendencies were selected. A talking circuit was set up through one pair of wires, and by means of an ordinary receiver the effects that talking over this circuit had on the other circuits in the group were noted. The comparison of these results with measurements taken of the crosstalk couplings is shown in *Table II*. A study of this table indicates only one real discrepancy (pair 27) from what could be expected. Therefore it is believed that the crosstalk on this circuit was much clearer due to the noise level being much lower. While the other circuits listened on had varying degrees of noise, this pair was comparatively clear.

(*Please turn to page* 70)

Table II.—Comparison Of Aural Crosstalk With Measurements

These results were obtained with pair 46, cable 1, as the talking circuit and as the powered circuit.

Pair	Aural Results	Coupling Measurement in db
19	Very noisy, crosstalk slightly audible	47
21	Very noisy, crosstalk audible	37
22	Little noise, no crosstalk perceptible	66
23	Induction from radio-control circuits, crosstalk very faint	66
27	Crosstalk clear and nearly intelligible	56
29	Noisy; induction from other circuits, crosstalk slightly audible	51
30	Clear except induction from radio-control circuits; very slightly audible crosstalk	55
50	Noisy; induction from radio-control circuits; slightly audible crosstalk	51

MODERN Central Office MAINTENANCE Practices

Section IX-E of Mr. Reed's article concludes a discussion of—(1) Central Office Battery Charging Equipment, (2) Diverter-Pole Generator, (3) Rectifier Units, (4) Automatic Battery Charger and, (5) Emergency Charging Equipment.

By JOHN S. REED
Lincoln, Neb.

THE NORTH self-regulating charging units are designed to function as battery chargers, or as battery eliminators (or power converters) when equipped with filters to reduce ripple in the output. They are completely self-regulating units, employing a saturable reactor in series with the voltage applied to the rectifier. The reactor causes the voltage to be increased or decreased in proportion to the voltage of the central office battery, or in proportion to the current drawn by the load.

Figures 119 and 120 illustrate the general appearance of a wall mounted North charger. As indicated in Figure 121, the component parts of the charge are a power transformer, saturable reactor, dry disc rectifier, shunt coil, choke coil, "overcharge" switch, and no-voltage alarm relay.

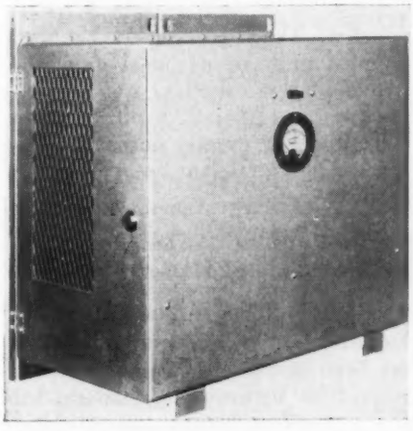


Fig. 119—North self-regulating wall mounted charger for 48 volts output.

The power transformer isolates the battery from the a-c power line and delivers alternating current of the proper voltage to the saturable reactor and rectifier. The dry disc rectifying stacks convert the alternating current to pulsating current which flows through the reactor and the choke coil to the battery. The choke filters the d-c output and removes the a-c ripple. A shunt coil is provided across the a-c input to the rectifier in order to maintain a low d-c voltage when the current drain is very low. For warning the exchange forces in case of a power failure cutting off the supply to the charger, an a-c relay is provided in the transformer secondary. As long as current flows in the circuit, the relay holds its contact open, but when the power is cut off, the relay falls back and closes the contacts to the remotely located alarm.

When the a-c power is turned on with the "CHG" switch in the charging position, the battery is on self-regulating charge. As soon as the battery voltage rises to a certain value, the charger will cut out. Then, as the battery discharges into the load, its voltage gradually falls until it

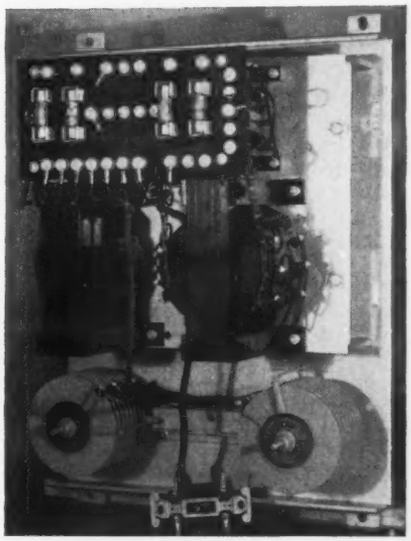


Fig. 120—Open view of North 4-ampere selenium-rectifier, cabinet type charger.

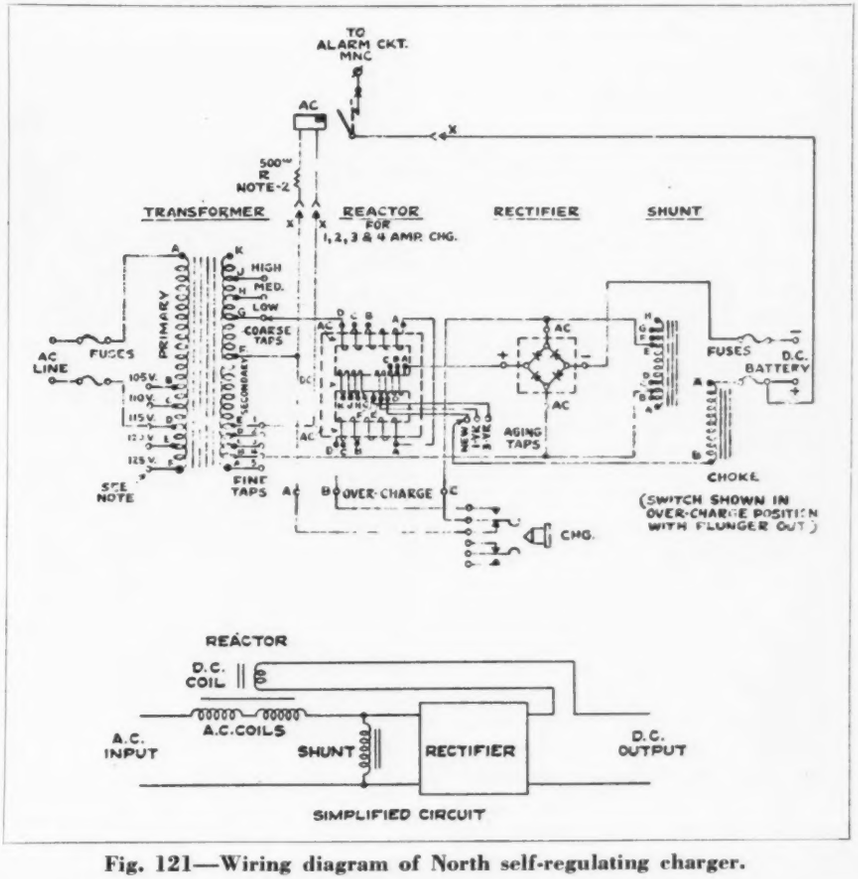


Fig. 121—Wiring diagram of North self-regulating charger.

reaches the minimum point at which the charger cuts in and resumes charging the battery.

In event of a prolonged power failure and the battery capacity becomes nearly exhausted, the charger may operate to bring the battery back to normal voltage and yet not restore the normal specific gravity. When this happens, the "CHG" switch is operated to the overcharge position, causing the charger to charge the battery continuously until the specific gravity of the cells rises to the desired value. In the overcharging position, the "CHG" switch causes the a-c input to the rectifier to by pass the saturable reactor.

In explaining the action of the saturable reactor, this control element consists of a three legged iron core with a d-c coil on the center leg and a-c coils on the outside legs. The d-c from the charger passes through the center winding of the reactor. When the current drawn from the charger is low, the reactor is unsaturated and the impedance of the a-c coils is high. At this point the current drawn by the shunt coil causes a large voltage drop in the a-c coils, resulting in a low value of the a-c voltage applied to the rectifier.

When the output current increases, the reactor becomes saturated, reducing the impedance of the a-c coils and raising the a-c voltage applied to the rectifier. Since an increase in the output current boosts the a-c voltage in proportion, the d-c output voltage is maintained at a constant value over a wide range of current variations.

Referring to *Figure* 122 which shows the voltage-current curve of the charger output, when the output is low, an increase in the current drain will cause a drop in the output voltage along the a, b, c, portion of the curve. As the current drain increases, the reactor saturates and the output voltage rises along the c, d portion of the curve. At high current output, the reactor is completely saturated; therefore a further increase in the current drain does not increase the a-c voltage on the rectifier, and the output voltage again drops, this time along the d, e portion of the curve.

When the battery voltage begins to drop from its fully-charged value as the battery discharges, this voltage drops and the charging current increases along the curve a, b, c. When the point "c" is reached, a slight increase in current flow causes the output voltage to rise, but this voltage rise also increases the current. The effect is that the charging rate suddenly jumps from point "c" to point "e". Point "c" is the "cut in" point.

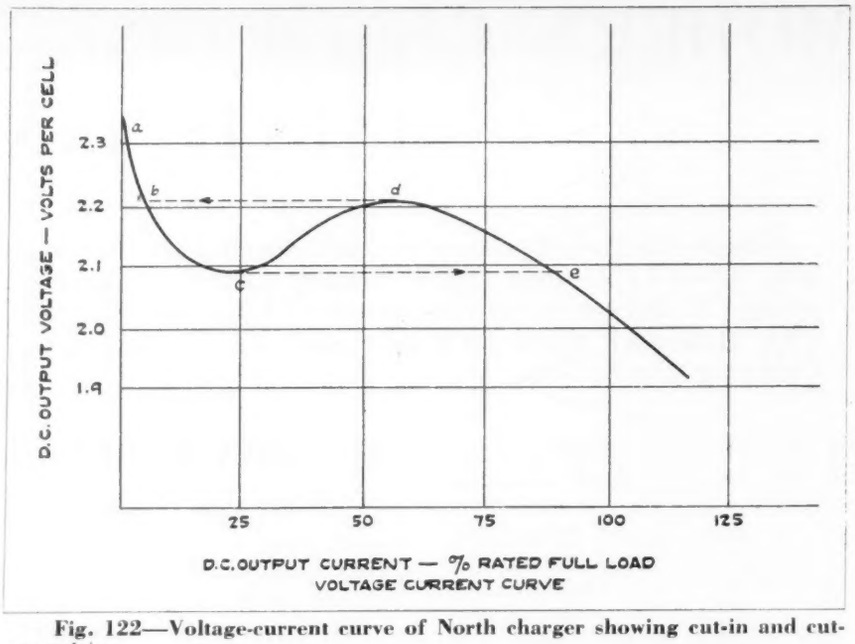


Fig. 122—Voltage-current curve of North charger showing cut-in and cut-out points.

When the battery is on charge, its voltage rises and the charging current decreases along the curve from "e" to "d". When point "d" is reached, any slight drop in the current causes the charger output voltage to fall, but this voltage decrease also reduces the current still further. The charging rate suddenly decreases from point "d" to point "b". Point "d" is the "cut out" point.

The charging equipment is provided with "aging" taps to compensate for changes in rectifier characteristics with age, a-c input voltage taps, and fine and coarse taps for adjusting the a-c input to the reactor and rectifier for optimum charger operation.

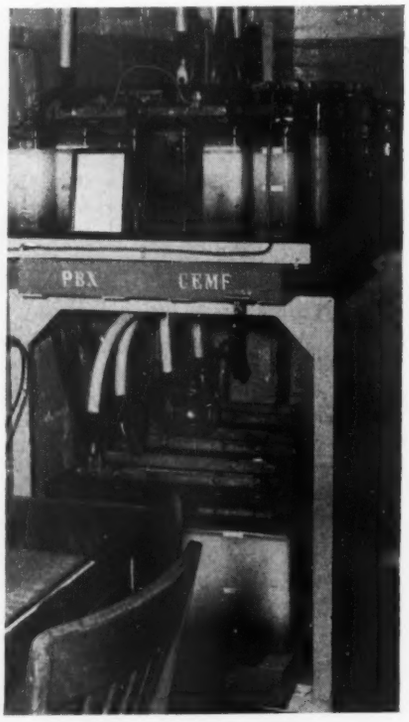


Fig. 123—Typical counter cell installation. The large cells at the rear and on the bottom are multiplied for use with the main central office battery.

North chargers are available for use with 24-volt, 12-cell batteries in output capacities ranging from 1 to 10 amperes, or with 48-volt, 24-cell batteries in capacities from 2 to 10 amperes. They are made as wall mounted units or as panel units for switchboard assemblies, and are obtainable for 110-or 220-volt, 60 cycle operation. For greater output capacities, two chargers can be operated in parallel.

End Cells and Counter Cells for Voltage Regulation

PROPER REGULATION of the battery charging output voltage has been stressed as being very important to assure long battery life and to protect central office equipment from undervoltages or overvoltages. To enable a smaller storage battery installation to be used and still maintain the overall battery voltage at normal rate it is the practice to employ end cells or counter cells to adjust this voltage as required.

As the term indicates, end cells are standard lead-acid cells arranged to be cut out at the end of the battery string when the battery voltage falls below a minimum value on discharge. When the voltage rises as the battery is charged, these cells are cut out, thus maintaining the overall voltage at nearly the desired point. Several cells may be connected to or disconnected from the main bat-

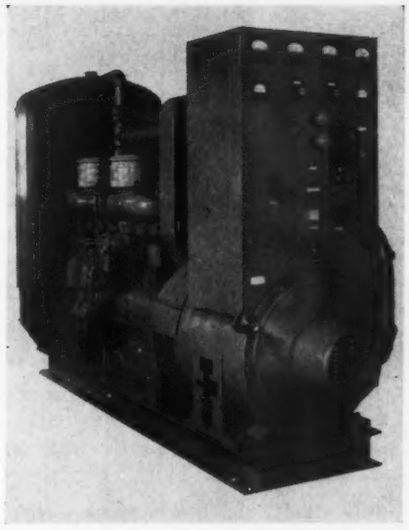


Fig. 124—United States Motor Corporation high-capacity engine-generator with special switchboard panel which may be arranged with all necessary equipment for automatic transfer control.

tery, one by one, or all at once according to the practice established for the office. In large and medium size automatic central offices, there are usually 23 cells in the main battery string with 3 end cells. Automatic controls are employed to cut in the end cells when the main battery voltage falls to 46 volts and to cut out the cells when the voltage rises to 52 volts.

The end cells are generally charged by a small manually controlled rectifier set to furnish a continuous trickle to keep the cells fully charged. When these cells, however, are much in use, they are charged along with the main battery, as the small rectifier does not have enough capacity to fully charge these cells during the short idle periods. In this case, the main charging equipment has to be adjusted to charge the main battery and the end cells.

Counter cells behave in the opposite manner from end cells. They have the peculiar property of developing a counter E.M.F. that opposes the main battery voltage, producing a subtractive effect. They are thus cut in when the battery voltage rises on charge and are cut out when the voltage falls as the battery is discharged. They are usually of the alkaline type with electrodes of thin nickle or stainless steel plates immersed in sodium hydroxide solution protected by a layer of oil on top of the solution. Since the electrodes are made of the same material, the counter cells can be con-

(Please turn to page 49)

Fig. 125—Onan standby electric plant for high-capacity service in permanent installations.

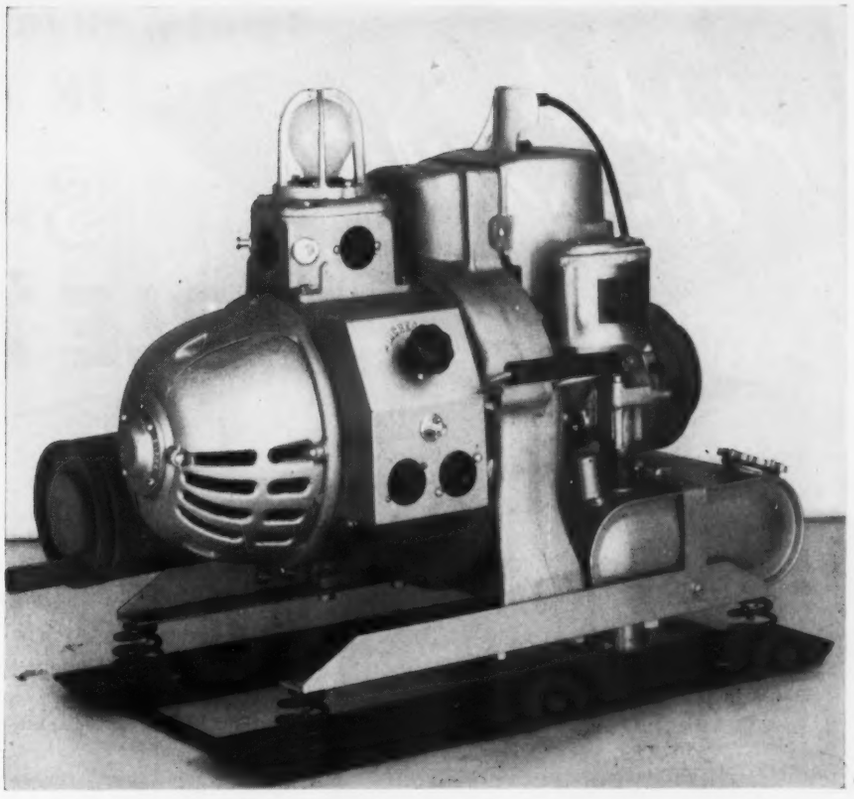


Fig. 126—Homelite alternating current gasoline engine-generator with capacity of 2500 volts at 115 volts a-c for single-phase emergency service.

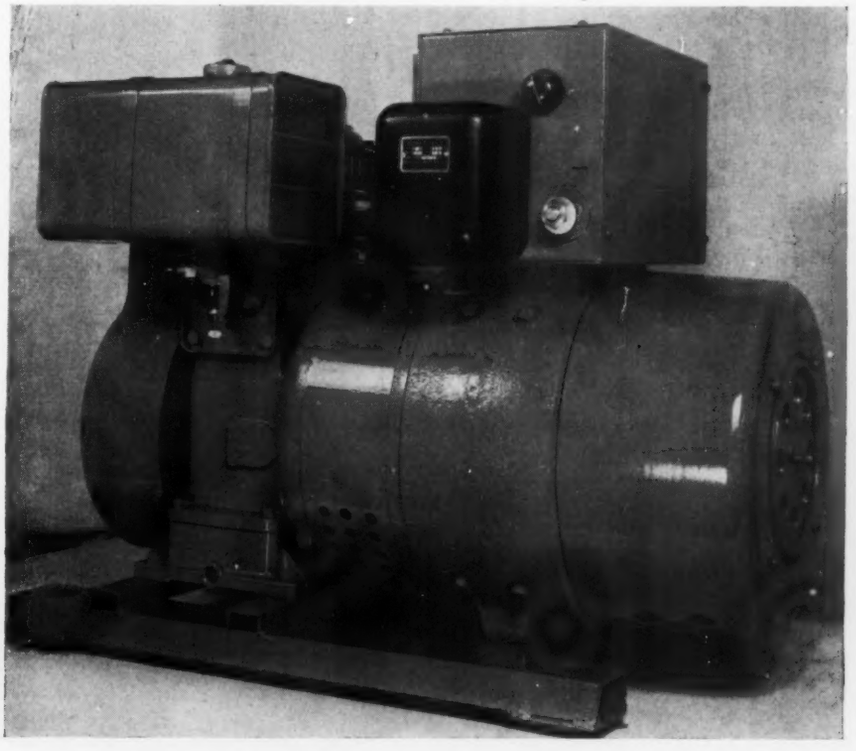
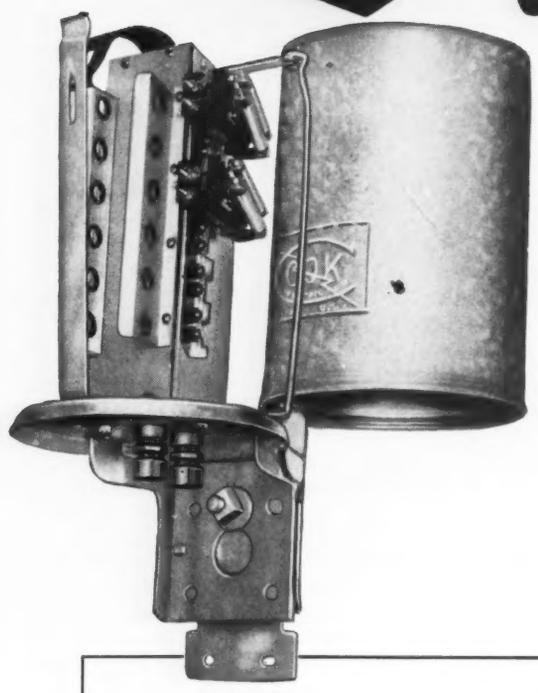


Fig. 127—Kato direct-current gasoline engine-generator for direct charging of storage battery.

Added Versatility IN THE NEW S-20 V CABLE TERMINAL



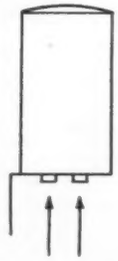
The new S-20V Terminal when used with plastic cable is manufactured with two cable entrances, each of which is arranged to take any size of compression coupling from 6 pair to 51 pair. When only one cable entrance is required, a standard pipe plug can be inserted to close the other entrance.

The new terminals, therefore, can now be ordered without couplings—and the couplings and pipe plug can be ordered later to conform to the specific cable layout.

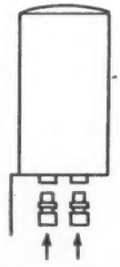
This method not only simplifies the installation of the cable, but also provides the maximum and economical use of the cable terminal.

When plastic cable additions are required at a later date, the terminals do not have to be removed from the poles to increase or reduce the compression couplings size in order to conform to the revised cable layout.

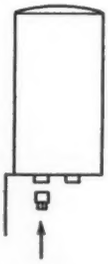
These features, when combined with the flexibility of the H-20 Protector units makes the S-20V Protected Pole Cable Terminal the most versatile terminal available to the industry.



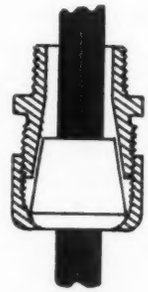
Each terminal is furnished with two 1" pipe threaded couplings for Compression Nozzles.



Compression Nozzles as required.



1" pipe plug when only one Compression Nozzle is required. Pc. No. 306-629



Cross Section showing construction of the Compression Nozzles used on the new S-20V.

S-20V CABLE TERMINAL	
No. Prs.	*Pc. No.*
6	506-2330
11	506-2331
16	506-2332
26	506-2333
51	506-2334

COMPRESSION NOZZLES				
Cook	*Cable Dia.*		*Ankoseal Cable*	
Pc. No.	*Max.*	*Min.*	*#22 Ga.*	*#19 Ga.*
506-630	½"	7/16"	11 pr.	6 pr.
506-631	5/8"	½"	16 pr.	11 pr.
506-632	¾"	5/8"	26 pr.	16 pr.
506-633	1"	7/8"	51 pr.	26 pr.

COOK ELECTRIC Company

Since 1897

2700 SOUTHPORT AVENUE **CHICAGO 14, ILLINOIS**

(*Continued from page 47*)

nected in the circuit without regard to polarity. They have practically no capacity but develop a counter E.M.F. of approximately 2 volts per cell with but little loss due to resistance of the solution. The water in the solution is decomposed by the current flow and it is necessary to add water to the cells from time to time.

Counter cells can be used to increase the reserve capacity of a storage battery installation. In this case, one more storage cell is added to the standard bank of 23 cells and one counter cell is connected in series with the main battery to cancel the voltage of this cell without decreasing the current capacity. In case of commercial power failure, the counter cell is short circuited after the battery voltage has fallen to the point where the additional voltage is needed, thus impressing the full voltage of 24 cells on the load. When the power is restored, the counter cell can be reconnected after the voltage has risen high enough to warrant the use of the cell. *Figure* 123 illustrates a typical counter cell installation.

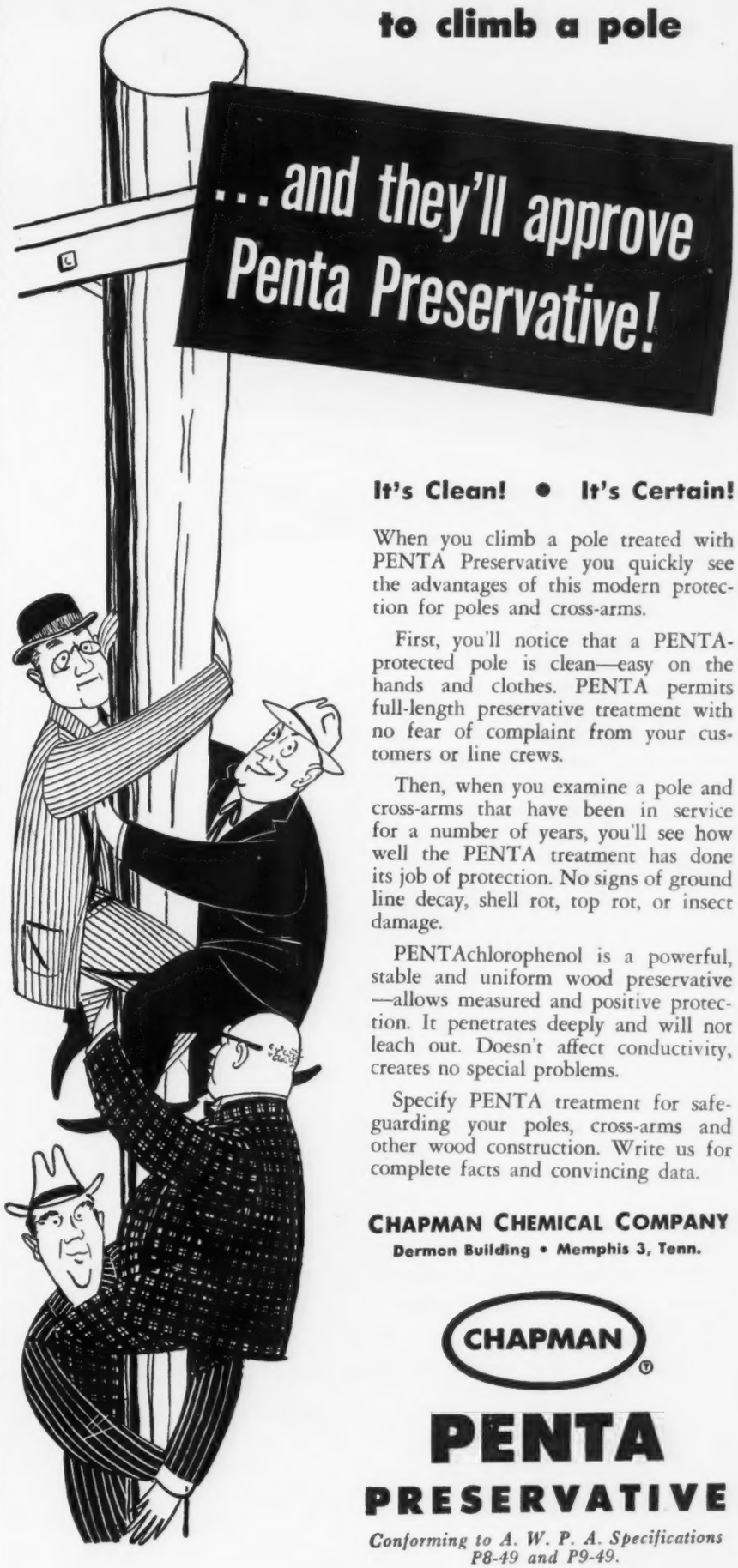
Emergency Charging Equipment

EMERGENCY charging equipment is provided for use in event of a prolonged power interruption that may cause a complete discharge of the central office battery. A discharged battery will result in an office failure with wide spread interruption of telephone service. Interruption of the service is a very serious matter, especially when commercial power cannot be restored for many hours, or even for days. Usually, the cause of the power failure is a storm or other disaster striking the community. At such a time, telephone communications are urgently needed for obtaining aid, directing rescue work, and restoring normal business and living conditions in the community.

The type of emergency equipment used in central offices depends on the size of the office. Larger offices are provided with a permanently installed engine-driven generator, while smaller offices make use of a light-duty engine-generator sets which may be permanently installed or be of the portable type. Portable sets are more economical for companies having a number of small or medium size adjoining exchanges. In this case, one engine-generator set may be stored at an exchange centrally lo-

(*Please turn to page 52*)

Invite your Board of Directors to climb a pole



It's Clean! • It's Certain!

When you climb a pole treated with PENTA Preservative you quickly see the advantages of this modern protection for poles and cross-arms.

First, you'll notice that a PENTA-protected pole is clean—easy on the hands and clothes. PENTA permits full-length preservative treatment with no fear of complaint from your customers or line crews.

Then, when you examine a pole and cross-arms that have been in service for a number of years, you'll see how well the PENTA treatment has done its job of protection. No signs of ground line decay, shell rot, top rot, or insect damage.

PENTAchlorophenol is a powerful, stable and uniform wood preservative —allows measured and positive protection. It penetrates deeply and will not leach out. Doesn't affect conductivity, creates no special problems.

Specify PENTA treatment for safeguarding your poles, cross-arms and other wood construction. Write us for complete facts and convincing data.

CHAPMAN CHEMICAL COMPANY
Dermon Building • Memphis 3, Tenn.

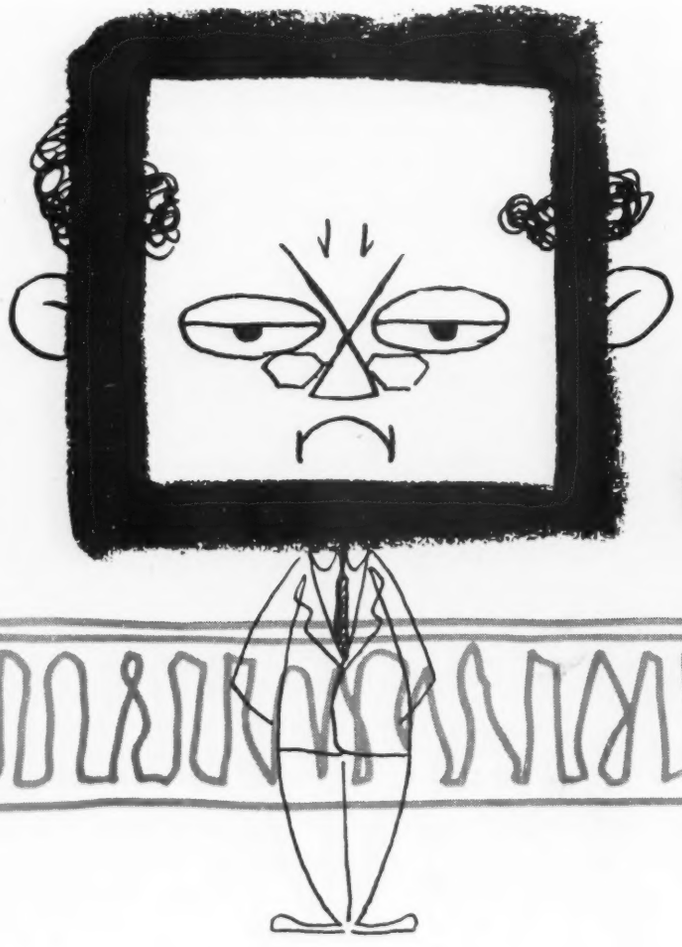
CHAPMAN

PENTA PRESERVATIVE

Conforming to A. W. P. A. Specifications P8-49 and P9-49.

Three kinds of

1



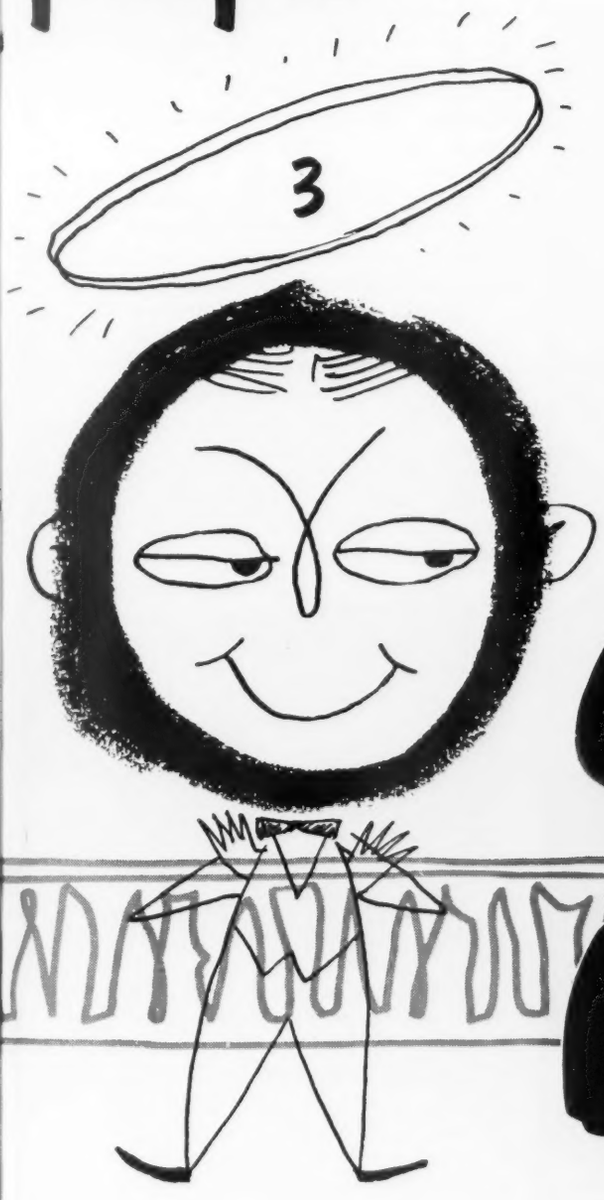
DOESN'T SEE MUCH ADVANTAGE TO OUR WONDERFUL WALL-DESK LEICH TELEPHONE.

2

SAYS OUR LEICH WALL-DESK TELEPHONE IS A SWELL IDEA . . . BUT DOESN'T BUY ANY.

LEICH MA

f people*



*In the hope of some day converting you to the No. 3 class, we'd be delighted to send you catalog and price information on Leich telephones. No charge or obligation. Address Leich Sales Corporation, 427 W. Randolph, Chicago 6, Illinois.

THINKS OUR LEICH WALL-DESK TELEPHONE IS PERFECT . . . AND BUYS THEM. INVARIABLY BECOMES VERY ENTHUSIASTIC AND EVEN SAYS HE MAKES MORE MONEY SINCE HE'S SWITCHED TO LEICH TELEPHONES.

MANUFACTURERS OF TELEPHONES, SWITCHBOARDS AND RELATED APPARATUS SINCE 1907

"FOR POLICE SIGNAL SYSTEMS

we rate

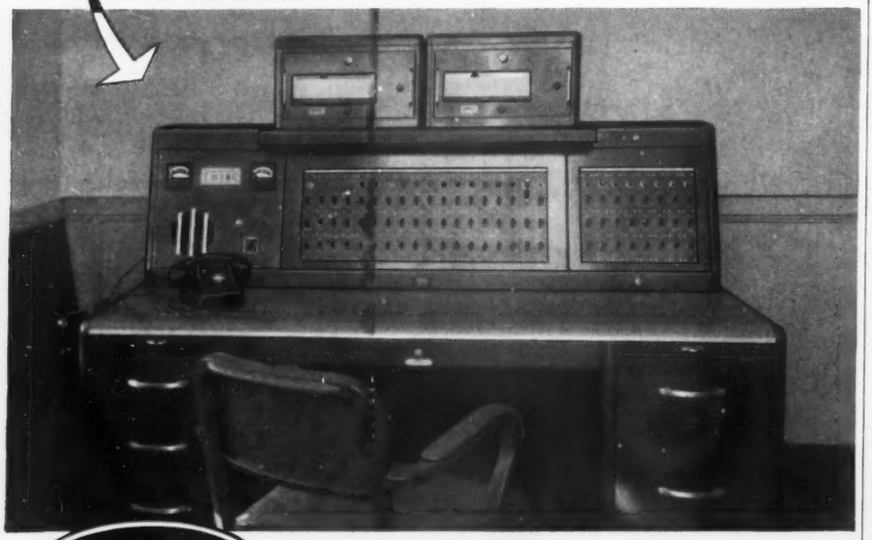
DEPENDABILITY

above all"

— SAYS

THE GAMEWELL COMPANY

Here is the Police Desk of a recently installed Gamewell Signal System. The Gamewell Company recommends and uses RectiChargeRs for complete reliability under all service conditions.



RAYTHEON **RECTICHARGER®**

(BATTERY CHARGER)

is used by Telephone Companies from coast to coast because this same *dependability* has been tested and proved through years of service. Fully automatic, it maintains constant voltage output over the complete load range . . . follows the load and compensates for wide input changes. Never overcharged or undercharged, batteries last longer. Ruggedly built . . . no moving parts to wear . . . require inspection only once or twice a year.

RAYTHEON

MANUFACTURING COMPANY

EQUIPMENT SALES DIVISION

DEPT. 6470-TE, WALTHAM 54, MASSACHUSETTS

DISTRICT OFFICES: BOSTON, NEW YORK, CLEVELAND, CHICAGO, NEW ORLEANS, LOS ANGELES (WILMINGTON), SAN FRANCISCO, SEATTLE

INTERNATIONAL DIVISION: 19 RECTOR ST., NEW YORK CITY

RAYTHEON PRODUCTS INCLUDE:

MARINERS PATHFINDER* radar; Submarine Signal FATHOMETERS*; Marine radiotelephones; WELDPOWER* welders; Voltage stabilizers (regulators); Transformers; RectiChargeR* battery chargers; RectiFilteR* battery eliminators; Sonic oscillators for laboratory research; Standard control knobs; Electronic calculators and computers; Television receivers; Radio, television, subminiature and special purpose tubes; MICROTHERM* diathermy and other electronic equipment. *Reg. U. S. Pat. Off.

RectiChargeR® is the ideal time-tested equipment for Telephone service. Your supplier offers a COMPLETE Line for all requirements. Ask him for details, or write us direct.

RAYTHEON

Excellence in Electronics

cated with respect to other exchanges, ready to be transported to any office needing the emergency equipment. There is the possibility, however, that a disaster may affect several communities in the same area and more than one exchange may need the emergency unit at the same time. It is thus advisable to make a study of exchange requirements and provide more than one engine-generator set at separate locations from where they may be moved to exchanges in a disaster area if needed.

Emergency charging equipment may have a d-c generator intended for directly charging the central office battery, or it may have an a-c generator of the same frequency and voltage as the commercial power supply, which can be used to furnish emergency power to the standard charging equipment. The latter arrangement is considered desirable by many telephone companies for the reason that the a-c generator can supply power for the lighting system in the building and for operating soldering irons and power-driven tools within its capacity.

High-capacity engine-generator sets for permanent installation in large central offices are illustrated in *Figures* 124 and 125. In locations where power interruptions are rela-

Fig. 128—Onan standby engine-generator equipment for emergency use in small exchanges.

tively frequent, it is desirable to use automatic line transfer controls with this equipment. When the commercial power supply fails, the control equipment will transfer the load from the power mains to the standby equipment and, at the same time, control the electric starter. Then when the power service comes back on, the control will transfer the load back to the power main and stop the emergency generator. If the starting battery is a separate unit from the office battery, it should be maintained in a fully charged condition by independently operated trickle charger.

Portable type engine-generator

sets are shown in *Figures* 126 to 128. A satisfactory generator capacity for small and medium-size unattended central offices is 2½ kilowatts. The voltage, frequency, and phase ratings should correspond to those standards for the exchanges where the emergency equipment is to be used.

It is important to specify the proper type of engine in the engine-generator sets when purchasing these units. Although gasoline operated engines are generally preferred, their use may not be practical in some localities where ordinances in regard to storage of gasoline on the telephone company premises are extremely strict. In some cases, storage of the inflammable liquid is prohibited and, in others, insurance rates may be greatly increased. In such instances, a diesel engine is specified in place of the gasoline type.

Use and Maintenance of Emergency Charging Equipment

A PERMANENTLY installed engine driven generator that is not provided with a suitable metal cover or hood by the manufacturer, should be adequately covered with a tarpaulin during idle periods. The apparatus should be kept clean and properly lubricated. At regular intervals, the generator should be started and allowed to run for a half-hour to an hour to test its operating condition and make sure that it will work properly when needed.

Portable engine-generator sets should be kept clean and dry in their storage locations. Before storage after use each time, their fuel tanks should be emptied and kept empty until the equipment is actually put into use. An engine-generator unit should never be operated inside the building unless provision is made for conducting the engine fumes into the outside atmosphere. Unattended central office buildings may be provided with a special entrance hole which is merely a short section of 2-inch diameter conduit leading into a conduit box installed on the outside wall. The exhaust duct is inserted through this entrance before the engine is started. If the engine-generator set is operated out-of-doors, the generator leads are brought in through the entrance hole in place of the exhaust duct.

If an a-c type generator is employed to furnish emergency power to the central office and to the battery, the switch connecting the commercial power line is opened and the generator leads are clipped onto the switch blades or inside terminals. When the generator does not have sufficient capacity to handle the entire building load, part of the branch circuits not essential to the operation of the office equipment may have to be disconnected. In some cases, it will be found that the regular charging equipment is wired to operate on 220 volts, single phase. It may be possible to change the connections in the charging equipment to enable it to operate on the 110-volt output of the emergency generator. Regular charging equipment should always be marked to indicate their supply voltages to avoid connecting them to emergency generators of wrong voltage output for this equipment. Three-phase chargers must necessarily be operated by a three-phase emergency generator.

When the engine generator set is of the d-c voltage output type, the charging circuit in the central office should be properly designated as to polarity and location of the connections. Care should be exercised to properly connect the generator leads with respect to polarity.

Once the portable engine-generator unit is started and is running in a normal manner, it will not require attention except for occasional filling of the fuel tank. If the emergency equipment is to be left in operation for a long period of time at an unattended exchange, arrangement can be made with a local garage or filling station to refill the fuel tank at the required intervals. This procedure will free the maintenance man for other duties and will make it unnecessary for him to return during inconvenient hours just to fill the fuel tank.—*Section X of Mr. Reed's article will appear in the June Fortnightly Telephone Engineer.*

QUOTE

"Those who have . . . paid their taxes for 1951 have been faced with a larger tax bill than they paid last year — another new reminder that the cost of government at all levels has taken another jump upward." — *(Tyndall, (S. D.) Tribune and Register).*

"Modern Central Office Maintenance Practices"

Test Questions on Sections IX-A, through IX-E—Central Office Battery Charging Equipment; Diverter-Pole Generator; Rectifier Units in Battery Charger; Automatic Battery Charger; Convotrol Battery Charger; Flotrol Constant-Voltage Battery Charger; Three-Phase Flotrol Charger; Recticharger Battery Charger; Electrolux Automatic Battery Charger; Maintaining Battery Charger Equipment; End Cells and Counter Cells for Voltage Regulation; Emergency Charging Equipment; Use and Maintenance of Emergency Charging Equipment.

(1) What are the essential requirements of the central office battery charging equipment? Why should they be important?

(2) Explain how the Diverter-Pole motor generator maintains its voltage output at a constant value.

(3) Describe the rectifying action that occurs in a selenium dry-disc rectifier. How can its life be maintained indefinitely?

(4) How does an automatic battery charger of the static type control its output when it has no moving parts?

(5) Describe the action of the type of automatic battery charger used in your company.

(6) What precaution should be observed with respect to the output capacity of an automatic battery charger?

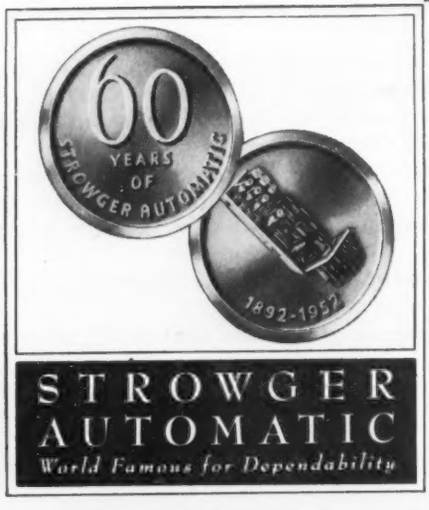
(7) What is the purpose of the end cells in a storage battery installation?

(8) Where is the counter cell used? How does it differ from an end cell?

(9) Why is it necessary to provide emergency charging equipment?

(10) What is your opinion in regard to using an a-c or a d-c type of emergency engine-generator?

Automatic's FORESIGH



STROWGER
AUTOMATIC
World Famous for Dependability

...HT is your *best* protection!

When Automatic Electric quotes
on new equipment for your exchange,
there's no skimping on quality
—*or* on quantity.

Automatic quotes with FORESIGHT!
—that is, on equipment which represents
a realistic estimate of your present needs,
plus adequate provision for your future requirements.
Automatic's recommendations include
ample trunking facilities
to insure the highest service standards,
and completely satisfied subscribers.
Regularly, enough *extra* equipment,
such as switch banks and shelves, is provided
to permit expansion at lowest cost.
On your auxiliary equipment, too,
Automatic provides for the future!
For example, where a battery charger
or ringing generator of a given capacity
would be adequate initially,
Automatic provides additional capacity
to accommodate growth;
so, too, with all other equipment
for your complete exchange.

Sixty years of successful exchange planning
has proved the importance of this foresight
to our customers.
When *you* are considering quotations, remember:
Automatic's FORESIGHT *is* your *best* protection!

AUTOMATIC ELECTRIC

Originators and Developers of the Strowger Step-by-Step "Director" for Register-Sender-Translator Operation . . . Machine Switching Automatic Dial Systems
Makers of Telephone, Signaling and Communication Apparatus . . Electrical Engineers, Designers and Consultants

Distributors in U. S. and Possessions: Automatic Electric Sales Corporation
Export Distributors: International Automatic Electric Corporation
1033 West Van Buren Street, Chicago 7, U. S. A.

Small Company Talk

By BILL CORMAN, Associate Editor

HI. NEIGHBOR: As many of you know, one of my pet themes is that, in spite of all of the ways in which small company telephone people and large company employees think and act alike, there are a lot of ways in which they think and act differently, and it is hard for either to understand completely those differences. Which is a preface to the statement that my basic thinking is along small company lines, and that I readily recognize that as such it may be incomplete, and even inaccurate when considered from a different viewpoint.

Nevertheless, what I want to talk about this month, is a subject that I think small companies should begin to pay the compliment of some serious consideration—Toll Compensation. I have noted with interest that this subject was to be one of the first topics for discussion at the Executives' Conference in Colorado—and I would liked to have been able to attend and hear what was said. However, the peculiar thing is that I had exactly the same feelings, and actually did hear the discussion, on exactly the same subject, in West Virginia last year. And in spite of the tremendous amount of work and study and questionnaire distribution and compilation, etc., etc., that has been going on, there have been no definite results as yet—at least I certainly haven't seen any increase in our per message commission schedules.

As any traffic expert reading this will have already guessed, I am not one. But I have a normal amount of curiosity, and it has occured to me to wonder why all this delay on a matter of such widespread importance.

Let me first admit that what I do know about the subject is enough to convince me it is among the most complicated in the telephone business. But so, if you come right down to it, is rate making, and where something needs to be done, most commissions are finding ways of doing it, even if they have to resort to ordering partial interim, or temporary rate increases, *pending the final results of a long* complicated study. This is a theory that the telephone business has advanced to the commissions with a good deal of fervor and conviction. Why can't the same principle be used in our own dealings with each other? Let's grant that it may be a real whale of a chore to determine if the "A-1" commission on a certain call should be 22.1 cents or 22.2 cents, but if the commission is now .17 cents, why can't an agreement on 22 cents be reached as an interim proposition?

I have heard the theory advanced that the Bell System is proving to be the bottleneck, but this I can't accept too readily. That System, which would be the one to stand most of the cost of an increased per message commission, is just winding up another enormously complicated process with FCC whereby its interstate net profit could be reduced to a figure that the FCC could go along with. A per message commission increase would, at least partially, have accomplished the same result. Furthermore, every Bell System executive who has studied the figures, knows that it is good business for the Bell System when its surrounding Independents build up their properties (and at the same time their use of long distance facilities). Revenue is a necessary ingredient to obtaining money with which to do such a job and increased toll revenue is probably as good as any other kind. So if the Bell System is the Hold-up factor, it would appear to me that it is an extremely short-sighted policy, which is the sort of policy the Bell System is *not* famous for. It might also be pointed out that *any* company which has enough toll lines would find its net profit reduced if the per message commission were increased. For where per message commissions are increased, the toll line prorate is reduced by just that much, and if the prorate reduction more than offset the per message commission increase, then the company's net profit would go down. This is the reason that some companies want the per message commissions increased while others would just as soon leave them where they are.

Another question that comes up concerns the assumption used above that some increase is in order on the per message commissions. And since we are not delving into those "enormously complicated" figures, let's just apply a little reasoning and see where we come out.

Let's first assume that the present schedule of per message commissions was reasonable and just *when it was put into effect.* This seems a reasonable enough assumption, since that schedule was based on the same sort of exhaustive study that is now being prepared and was agreed to by all interested parties. Now since that time, and at least in this (Southern) section of the country, there have been two general increases in toll call rates. The effect, in our own company, has been that our average per toll call has gone up from about 75 cents to about 95 cents. Some of this, so they tell me, is due to the fact that our subscribers are talking farther and longer, but the large share of it is due to the increased toll rates (which have largely been on shorter

haul calls). Thus, on 1000 average calls we are now taking in $950 (not counting tax) where we used to take in $750. So far, so good. But, when we look at our "A-2" schedule, we find that of that increased $200, we are retaining as net toll revenue only $11 in increased "A-2" commissions. If you happen to be a toll center and get the "B" commission also, of the $200 you will retain only another $30. So, even if you get the A and the B commissions, you will collect $200 more from your subscribers but you retain only $41 of that increase. (These figures will vary depending on locality and the average per call revenue). The other $159 goes to the company which gets the toll line prorate. So far then, not so good, unless you are the one getting the prorate, which most Independents are not.

Now why, if our assumption that the schedule was reasonable, is this correct? The reason is that a specific per message commission schedule is designed with the idea of providing a reasonable split between commission and prorate, based on a given revenue (toll rate) and expense (largely wages) structure. *When the given revenue and expense structure changes, the schedule goes out of date.* Can anyone argue that such is not now the case?

Another angle to this question is the manner in which such schedules are built. Study for a moment the following table taken from a typical toll settlement schedule:

Where average revenue per message is:	Amount of Commission per message:		
	A-1	A-2	B
$ .15	.099	.095	.046
.25	.152	.131	.086
.50	.196	.170	.163
.75	.222	.196	.201
1.00	.240	.209	.237
1.50	.260	.229	.285

You will notice that as the average revenue per message goes up, the commissions also go up, *but not in proportion.* For example, when the average revenue goes up 10 times (from $.15 to $1.50) the A-2 commission goes up only a little over 2 times (from $.095 to $2.29). The reasons for these seeming discrepancies are highly complicated by a multiplicity of factors, but stated in possibly the simplest terms, the reasons are as follows:

The "A" commissions are generally called "originating" commissions, in that they are basically supposed to cover the costs incident to the origination of the call. Such costs clearly are not 10 times as much for a call producing $1.50 revenue as they are for a call producing only $.15 revenue.

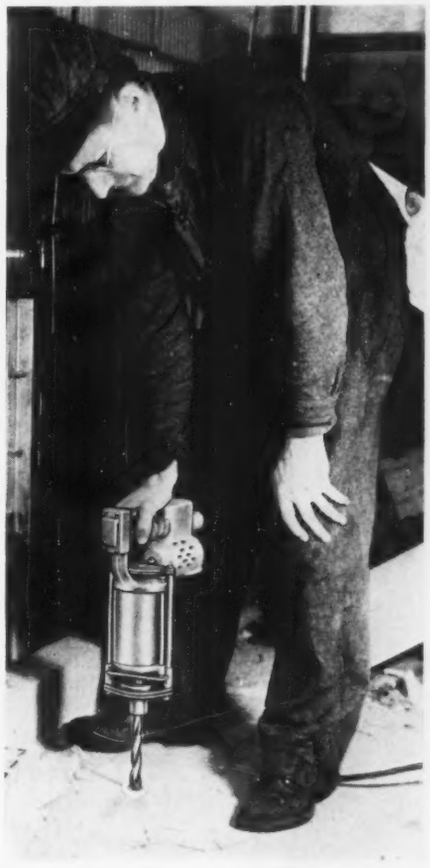
The "B" commission is a "handling" commission, in that it is supposed to cover the operator cost of handling the call. While such costs probably do not rise in direct proportion to the revenue, they are more nearly proportional than the originating costs, because it is manifestly more costly to build up a long circuit than it is a short one. This is reflected in the above schedule by the fact that, as the average revenue goes up 10 times, the originating commissions go up between two and three times, while the handling commission goes up over 6 times.

The "prorate" is that portion of the revenue left over after deducting the per message commissions, and is supposed to cover the cost of the use of the toll line facilities. From the above example you can derive the following prorate figures:

Where average revenue per message is:	Amount of Commission per message:			Leaving Prorate of
	A-2	B	Total	
.50	.170	.163	.333	.167
1.00	.209	.237	.446	.554
1.50	.229	.285	.514	.986

(*Please turn to page 60*)

Every Telephone Company Needs One!



The Syntron 10-RO "Self-Rotating" Hammer Drill takes labor out of drilling holes in concrete, brick and stone. It more than pays for itself in man-hours saved! No pressure is needed...it feeds in without effort as it drills. Simple, fool-proof mechanism. Hammer delivers 3600 blows per minute. This valuable tool is only one of the requirements that you can order from Telephone & Power Supply Company.

Immediate Shipment from Nearest Warehouse Points

- Syntron Hammers and Drills
- Mall Chain Saws
- Klein Tools
- Just-Rite flashlights
- Eveready Batteries
- Columbia Gray Label Dry Cells
- Miller Hydraulic Platform Trucks
- Cable Splicer's Tones
- Butane type Splicer's furnaces
- Complete Cable Splicing kits
- Poles and Crossarms
- Copperweld and galvanized steel strand
- J-M Transite Conduit
- Pole Line Hardware
- ALL tools for outside construction
- Alphaduct Dated Insulated Wire
- NEW Aluminum-coated steel telephone wire
- Complete Line of Cable Spinning Equipment, accessories, tools and materials

Write for Literature . . . Phone Our Office

TELEPHONE & POWER SUPPLY CO.
TOPEKA, KANSAS PHONE 4-2621

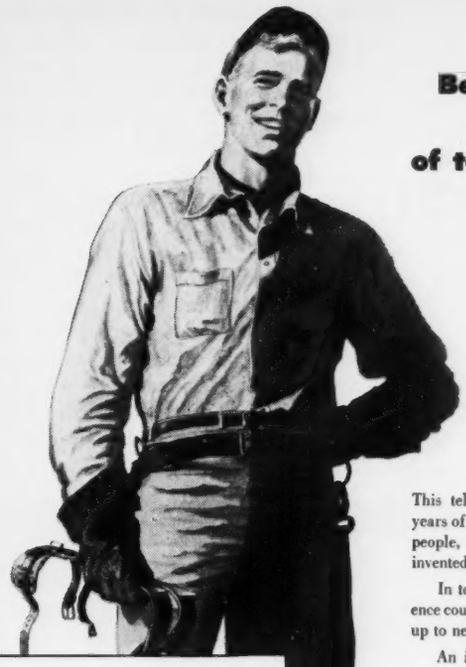
TELEPHONE MESSAGES

for Farmers

People in rural America lean heavily on the telephone for both business and social purposes. The telephone industry has dedicated itself to filling their needs and is bringing them more and more telephone service. The Bell System alone is putting in about 1000 rural telephones every workday.

That job's important. And it's also important to keep farmers posted on the progress that's being made in rural telephone service. Telephone advertising does that, month after month. On the opposite page are some typical advertisements currently appearing in national farm publications.

ADVERTISEMENTS OF THE BELL TELEPHONE SYSTEM



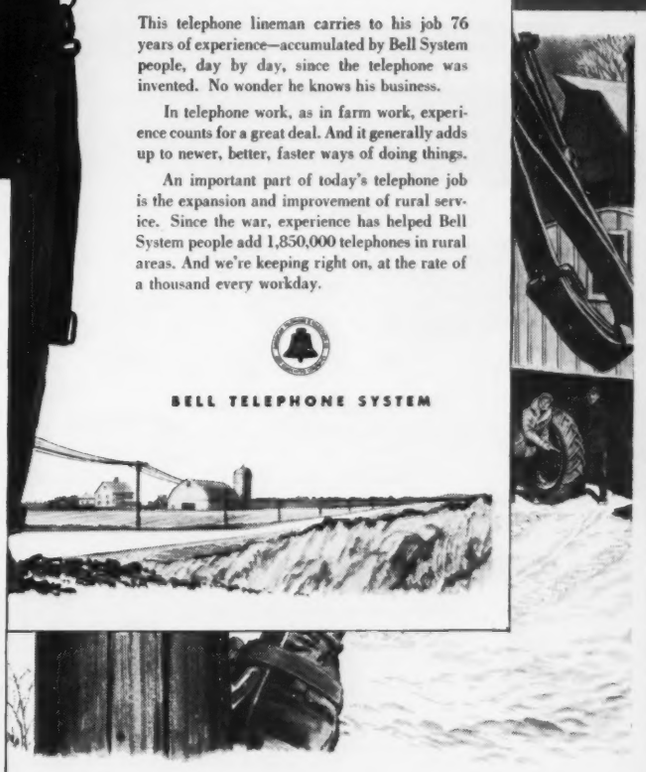
Behind him are 76 years of telephone experience

This telephone lineman carries to his job 76 years of experience—accumulated by Bell System people, day by day, since the telephone was invented. No wonder he knows his business.

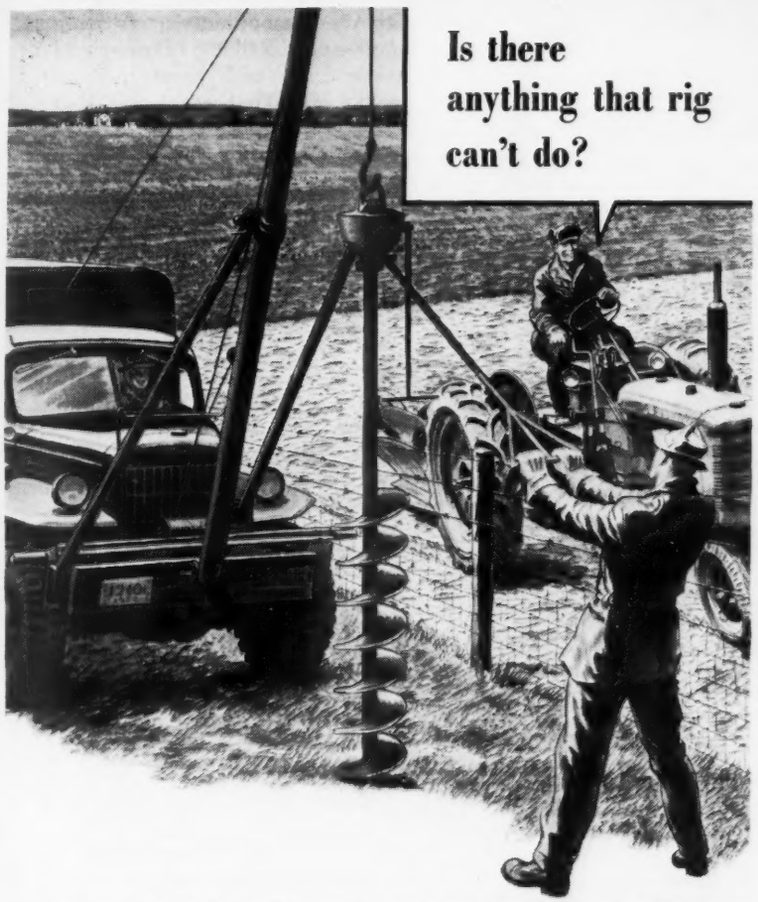
In telephone work, as in farm work, experience counts for a great deal. And it generally adds up to newer, better, faster ways of doing things.

An important part of today's telephone job is the expansion and improvement of rural service. Since the war, experience has helped Bell System people add 1,850,000 telephones in rural areas. And we're keeping right on, at the rate of a thousand every workday.

BELL TELEPHONE SYSTEM



Is there anything that rig can't do?



Sure... lots of things. But when it comes to helping us put in rural telephone service, this rig is mighty hard to beat.

With its all-wheel drive we can haul equipment almost anywhere. We use its power take-off to dig pole holes, lift and place the poles, and roll up wire on its reels.

Using this fast two-man truck, Bell System construction men have planted thousands of new pole lines in rural areas. It's an example of Bell's constant search for easier ways to do things better, to give more and more people telephone service.

We are making full use of experience, skill and modern equipment as we add two rural telephones a minute, every workday in the week.

BELL TELEPHONE SYSTEM

"Going to be chilly on that telephone pole today"

Keeping telephone paths clear and service good in Bell rural areas is a year-round job. Often it means turning up coat collars and heading into the storm.

At times the storm is violent, with gale winds, road-blocking snow and ice, or rain for days, followed by floods. Then Bell telephone crews are alerted in all directions — often in several states. They speed to the crippled area with their special skills and tools. And Western Electric, our manufacturing unit with supply depots located all around the country, gets all kinds of needed telephone equipment on the scene fast. Soon, repaired telephone lines join in the all-out effort to set the community on its feet again.

In day-to-day telephone work and in emergencies, Bell telephone people have the training to do the job fast and well. That's why the best rural telephone service in the world is right here in America — and it gets better all the time.

BELL TELEPHONE SYSTEM

(Concluded from page 57)

Again it is clear that as longer circuits are used, or as the holding time on the toll circuit goes up, the costs go up also and much more in direct proportion to the length of the circuit or the time circuit is held. The manner in which the above illustrated prorate rises is a reflection of this.

As stated, however, there are many complicating factors, which tend to offset the basic reasons set forth above. One is the recognition of the practical proposition that very low average revenue messages require extremely high percentages of the total to pay the handling and originating costs of these messages. (For example, the A-1 commission plus the B commission on an average call (revenue) of $.15, amounts to $.145, leaving only $.005 for prorate. Another of these complications is the increasingly obvious proportional decrease in the cost of providing long-haul circuits, due to carrier, microwave, co-axial cables, etc. This fact would indicate that the prorate need not be as high as percentage of the total revenue as has been necessary in the past, and that perhaps a higher percentage of the revenue of the higher average revenue calls should go into the A and B commissions. Increased use of, and better operating methods on, the longer circuits is leading in the same direction.

However, getting back to the $200 increase mentioned earlier, the added $41 that the connecting company gets to keep is what it would be supposed to keep if the entire $200 increase were due to longer circuits and longer holding time. But that $200 of extra revenue is only *partly* due to such reason, and is *mostly* due to the higher toll call rates now in effect. Those higher toll rates were obtained because the companies obtaining them proved to their respective commissions that their costs were now high enough to justify the increased toll rates. The cost of operating in connecting companies is going up also, but only a small part of the increased toll revenue received because of higher costs is being passed on to the connecting companies—they are getting only the increases due them because they are supposedly originating and handling calls that go farther and take more time (and therefore money) to put up. That extra $41 that we are keeping out of the $200 is paying us for the additional work we would have to do if the calls were that much longer—it is not designed to do anything else, and it certainly is not taking into consideration the fact that it now costs us more to put up the *same* call than it did six years ago.

In other words, if the company that owns the toll lines is due an increase in revenue because of increased expense, so are the companies that originate and handle calls: labor and taxes are primary factors to *both*, not just the one.

So, Neighbor, it seems to be high time—it seems to *have been* high time—that some overdue increases were forthcoming. Maybe if you and I and all the rest of us begin to imitate the "squeeky wheel" we will get some "grease".

QUOTE

"The House Appropriations Committee slashed an average of 10 per cent from the seven billion dollars requested for a dozen Federal agencies for the next fiscal year. For some departments the cuts ran as high as 33 per cent. More of this sort of thing might well 'obviate the need for deficit spending or more taxes', as one law maker expressed it."—*Anaheim (Calif.) Bulletin.*

How to Solve Your Cable Spinning Problems the Easy Way

Platform Clamps
Support splicer's platform from aerial cable—spun or otherwise. Won't slide on grade or damage cable. Bronze alloy.

Handline Block,
specially designed for spun cable, may be used on cable with any other kind of support. Clamps on strand. Won't slip on grade or damage cable. No wrench is needed. Bronze alloy.

Single Eye Hooks
...for four supporting adjustable ropes of a splicer's platform. Cadmium-plated steel.

Double Eye Hooks
make splicer's platform readily adjustable ...by threading supporting ropes through double eye. Cadmium-plated steel.

Lashing Wire Clamp
designed by Neale, holds spinning wire with positive action clamp when terminating at pole. Also keeps slack from running back in cable repairs. Bronze alloy with cadmium plated screw.

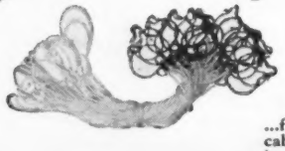
Soap Can & Brush
keeps pressure testing soap or paint in excellent condition. Cast aluminum for light weight. Tight-fitting cover serves as handle for brush. Container equipped with spring belt clip.

LITTLE GIANT Slack Pullers

Here's a combination of great strength and very simple operation...to make difficult operations easy. Furnished with either slip handle (left) or ratchet (right). Moving parts cadmium plated.

Cable Placing Ring Guide Roller
offers means of pulling cable in and takes down pull on tow line to truck. Cadmium plated steel with bronze bushing.

Cable Placing Shoe
is used ahead of spinner to raise cable from reel to strand in placing and spinning cable. Also used stationary at pole when placing with rings.



Steel Placing Rings
...for light cable. Slip rings onto cable at pole and attach to pulling line. Rings distribute themselves every five feet along span. Sets of 20, including 110 feet of rope attached.

Bronze Cable Placing Ring.
Roller design eliminates sheath damage of all sizes of cable. Cast bronze body and bronze rollers.

CABLE SPINNING MANUAL
gives complete details on operation of Neale Cable Spinner with easy-to-follow service and maintenance instructions.

CABLE SPINNING EQUIPMENT CO.
TOPEKA, KANSAS Phone 2-7234-5

"Sure they're powerful— you can even see the next pole!"

• Our little sportsman is rightfully proud, because the next pole is a long way off. That wire is Amertel 135, so the poles can be spaced 2½ times farther apart than if ordinary BB wire were used.

So you don't need as many poles. You dig fewer holes. Less pole hardware is required. You save hundreds of man-hours of labor per mile. Maintenance costs are lower, too.

Amertel 135 has low electrical resistance, and it has *far* better voice transmission characteristics than the old wire.

Write today for more information. Address American Steel & Wire Division, Rockefeller Building, Cleveland 13, Ohio.

LOOK FOR THIS TAG

It is your assurance of highest quality wire.

U·S·S AMERTEL

TELEPHONE & TELEGRAPH WIRE

AMERICAN STEEL & WIRE DIVISION, UNITED STATES STEEL COMPANY
GENERAL OFFICES: CLEVELAND, OHIO

IN THE WEST—COLUMBIA-GENEVA STEEL DIVISION, SAN FRANCISCO • IN THE SOUTH—TENNESSEE COAL & IRON DIVISION, FAIRFIELD, ALA.
UNITED STATES STEEL EXPORT COMPANY, NEW YORK

UNITED STATES STEEL

Questions and Answers

Edited By JAY G. MITCHELL

In this issue Mr. Mitchell discusses—(1) Required data for additional channel on 35 mile metallic circuit; (2) Transmission characteristics of HTL 135 and HTL-85 Telephone Line Wire; (3) Use of MEGGER® in localizing incipient cable trouble; and (4) Oversize ground rods.

QUESTION:—We would appreciate information concerning how to add one channel to an existing 35 miles metallic circuit using Simplex circuit or another system you think might be considered more convenient. Please also give us information regarding connections at both switchboards and to the metallic circuit. Two cord circuits of one switchboard are provided with No. 27A Western Electric repeating coils.

ANSWER:—This inquiry, which comes direct from a foreign country, cannot be answered in full because the characteristics of the 35 mile metallic circuit are not disclosed. The use of repeating coils to obtain a simplex circuit is very simple but might not be satisfactory because of disturbance from neighboring supply circuits or because of the nature of a grounded simplex circuit itself. A request is being sent to this correspondent via Airmail, which was the way the inquiry was received asking several items of information and when this is received it will be possible to advise him more fully.

It is advisable to learn the kind of circuit involved whether it is iron, copper or copperweld; whether it is paralleled by any power or light circuits and if so how long is the parallel; whether service over a grounded telephone circuit (the simplex) would be deemed adequate and if the installation of carrier (assuming that the present circuit is suitable for carrier) would be considered. Upon the receipt of these data we can undoubtedly be of some assistance.

QUESTION:—How do transmission characteristics of high strength steel wire compare with those of iron wire of the same gauge.

ANSWER:—This inquiry, which was propounded at a recent telephone convention and later submitted in writing, is not entirely clear since there are three types of high tensil strength wire. Transmission characteristics without identification is not a term susceptible of exact definition either. These points may be stated in the following way, howere, and this may be useful to the telephone company making the inquiry.

HTL-135 Telephone Line Wire is furnished in one gauge, number 12 B.W.G., only

HTL-85 Telephone Line Wire is furnished in the following gauges; Number 9 B.W.G., Number 10 B.W.G., Number 12 B.W.G., and Number 14 B.W.G.

The resistance *per conductor mile* of HTL-135 Telephone Line Wire is 38.23 ohms.

The resistance *per conductor mile* of HTL-85 Telephone Line Wire is as follows:

Number 9 B.W.G.	18.47	ohms
Number 10 B.W.G.	22.48	ohms
Number 12 B.W.G.	34.12	ohms
Number 14 B.W.G.	58.59	ohms

At normal voice frequency and current magnitude the transmission loss per mile of metallic telephone circuit at 1,000 cycles per second, on the average with HTL-135 Telephone Line Wire is about 5 percent lower than B. B. Telephone Wire. That, it will be noted, is at frequencies which lie within the range of audio frequencies. The same average results as to transmission efficiency were obtained in tests involving HTL-85 Telephone Line Wire and B. B. Telephone Line Wire.

The longer spans possible when HTL Telephone Line Wire is used also, of course, reduce the number of poles and hence the number of insulators and pins with some gain in the insulation of the line wire over that obtained when shorter spans are used. It is assumed, of course, that the proper methods of construction are employed as improperly made splices and the lack of proper guying to offset the pull when long

spans are the rule may render the HTL line circuits less rugged and reliable than they would be when proper methods of line construction for the HTL wire were employed.

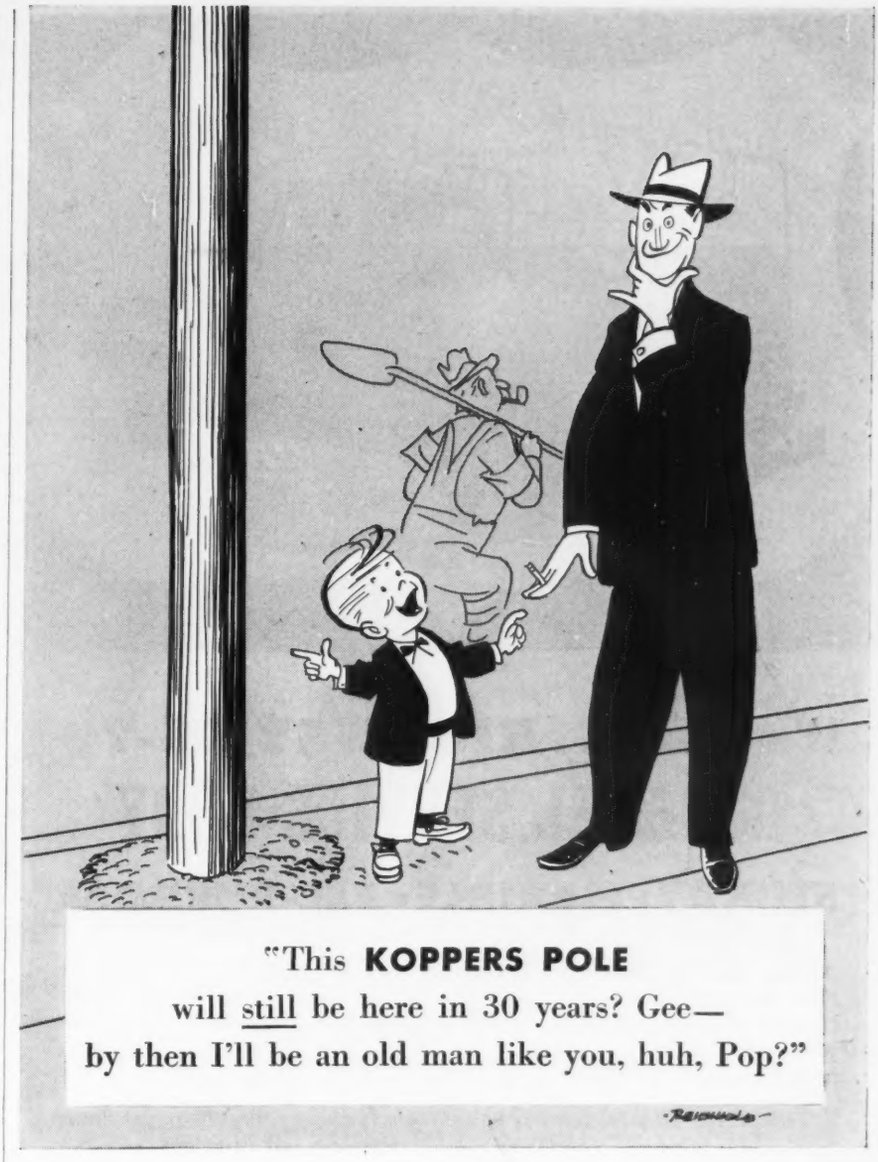
All in all it appears reasonable, and is borne out by experience, that HTL Telephone Line is productive of results superior to those that are obtainable with B. B. Telephone Line Wire. The figures and data were taken from data supplied by The Indiana Steel and Wire Company.

QUESTION:—In one of the issues TELEPHONE ENGINEER last winter you answered an inquiry about the high voltage method of localizing incipient cable trouble and we have been awaiting a more detailed answer to that inquiry than was given in the issue to which we refer. Specifically we would like to know if this method has been utilized when the energy for establishing and definitely localizing this type of cable trouble was supplied by some form of direct current generator.

ANSWER:—One decided advantage in the use of batteries as the source of the power in this method is that being of small output capacity in amperes they are, as far as the strength of output current goes, self limiting while the use of a generator with reserve capacity and reserve power would not be self limiting entirely, in this respect, and might result in greater damage to the cable than would be permissible. It is true, however, that the hand operated MEGGER, having an output of about 500 volts direct current, has been used for this purpose but, in my opinion, the small ampere capacity dry batteries are somewhat more convenient. The output of the MEGGER, of course, is also self limited as it is hand operated.

QUESTION:—We read your QUESTION AND ANSWER column regularly and find it very helpful indeed in many of the problems encountered in the operation of our telephone system. It has been noted that, in several cases, inquiries regarding the failure of existing ground connections have been answered with the suggestion that several ground rods be installed if the existing ground rod appears to be inadequate to prevent cross ringing on grounded telephone circuits served by the same switchboard. We have never seen any recommendation that ground rods of larger diameter be installed but several in which it has

(Please turn to page 64)



● Sonny doesn't realize it now; but, in all probability, he and this Koppers Pole will *both* be young thirty years hence.

Koppers Pressure-Creosoted Poles are famous for the way they last; for the way they provide long periods of dependable service; for the way they make line operation easier, better, more economical.

Specify Koppers Poles! These strength-retaining poles will cut your maintenance and replacement expenses.

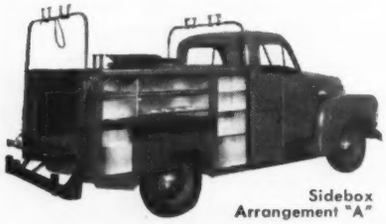
KOPPERS COMPANY, INC. PITTSBURGH 19, PA.

KOPPERS PRESSURE-CREOSOTED WOOD

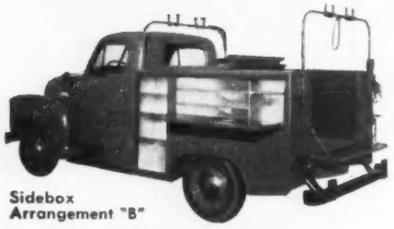
it's new... HIGHWAY GS-75
GENERAL SERVICE BODY
STURDY • FLEXIBLE • ALL-PURPOSE

At last! Here is a basic, general service body to which you can add your own selection from a wide variety of options to actually "build" a unit to meet your specific needs. At the same time you control the cost to fit your purse. With the Highway GS-75 you are not required to take a manufacturer's "pet ideas" as a permanent part of your body.

This sturdy all-steel body is equipped with heavy, double-panel doors opening on spacious side-box compartments. Two different side-box shelf arrangements are available as options. Locking-type, recessed handles on the doors control strong one key bar-locks. The doors are weather-sealed with sponge rubber, retained by metal strips. A popular option is the steel roof that slides forward, folds down and locks to the tailgate, protecting any materials stored in the big interior bed compartment.



Sidebox Arrangement "A"



Sidebox Arrangement "B"

Body is 75" length, 74" width. Mounts on most ½ ton chassis, "CA" dimensions 39" to 41".

Send today for full information on this new Highway GS-75 body and other Highway public utility equipment. Or, call or visit the friendly Highway Distributor or Factory Branch nearest you.

HIGHWAY TRAILER COMPANY

Headquarters: Edgerton, Wisconsin

PLANTS AT EDGERTON, WISCONSIN—STOUGHTON, WISCONSIN

The nation's largest Manufacturers of Utility Truck Bodies • Earth Boring Machines • Pole and Cable Reel Trailers • Winches • Power Take-offs • Service Accessories

been suggested that several ground rods not closer to each other than about ten feet, be installed to improve operating conditions that might be ascribed to the failure of the office ground connection. Since this very situation appears to be present in one of our small offices, serving several grounded telephone circuits, we would like to have some comments on the advisability of installing 2" pipe provided with a sharp tip instead of installing several of the conventional ground rods all carefully connected together. Stamped and directed envelope is enclosed for your convenience in making direct and early reply.

ANSWER:—The resistance of an earth connection obtained by the use of any form of ground rod is not appreciably reduced by using ground rods of large diameter. While there is a very slight advantage, in this respect, in the use of ground rods of larger diameter it is more than offset by the greater difficulty of installation of the larger rods and is not remotely comparable to the reduction in the resistance of the earth connection resulting from the use of several conventional ground rods not closer together than about ten feet and carefully and permanently bonded together. There is a definite gain, in this respect, in the use of longer rods when the conventional length does not pierce the soil to a sufficient depth to reach more or less permanently moist strata of the earth's substance.

The controlling factor in this earth contact resistance is the degree to which the ground rode makes electrical contact with the soil. Obviously

(*Please turn to page 66*)

QUOTE

"Breadwinners of Tombstone who filed returns for the biggest Federal tax grab in history, probably don't know the half of it. The most extravagant Federal bureacracy in history is costing you money in far more ways than are shown on income tax forms. Here are the open and hidden Federal levies on average families of this community: About $331 comes out of an annual income of $1500, $952 out of a $3500 income and $5087 out of a $12,500 income."—*Tombstone (Arizona) Epitaph.*

High tide in the cellar

Fred Hubbard woke to hear the sump pump running . . . *continuously!* One look in the cellar showed a drain had backed up after last night's deluge. A telephone call . . . and plumbers soon had the flood under control.

• • •

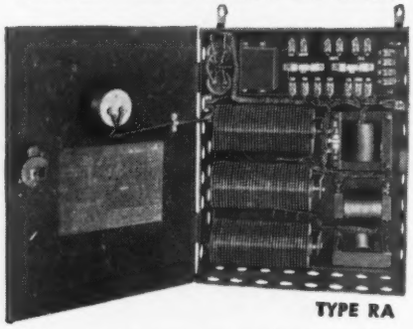
Behind the accepted reliability of telephone service there is a dramatic story of continuing *research*, of skillful *manufacture* and dependable *operation* written by America's telephone industry.

Western Electric's part in the story is to manufacture the kind of telephone equipment which helps to make this reliable service possible.

Western Electric

TELEPHONE APPARATUS AND CABLE

DEPENDABLE POWER
For PAX and PBX SYSTEMS
Electrox*
CONSTANT VOLTAGE BATTERY ELIMINATORS



TYPE RA

The most economical telephone power supply is an Electrox Battery Eliminator

Powered from your regular 110-volt lighting system.

Electrox Eliminators provide smooth, hum-free D.C. of required voltage — eliminating batteries.

Automatic operation. Output voltage remains practically constant, regardless of current drain. When desired, provision can be supplied to switch to emergency power source automatically.

Battery chargers and battery eliminators available in sizes and capacities to meet every power requirement.

See your Electrox Jobber. Write for free Bulletin 1465.

*T.M. Reg.

RECTIFIER DIVISION
SCHAUER
MANUFACTURING CORP

4516 Alpine Ave. Cincinnati 36, Ohio

there is not much difference in this to be expected solely from the use of a larger diameter rod. *It is extremely* important, however, that the work of driving any ground rod be so conducted as to avoid whipping or vibration of the rod because the effect of such whipping or vibration is, of course, to enlarge the hole and thus impair the electrical contact with the surrounding soil.

Conventional ground rods are now available in which the upper end is threaded so that an expansion can be attached when it is necessary to drive the rod to a greater depth than is possible with the usual length of the rod itself. Rust on the rod is not, in itself, particularly objectionable but grease or paint must be thoroughly removed before installation.

PENINSULAR TEL. CO.: $6,000,000 Construction Budget

A CONSTRUCTION budget for 1952 of approximately $6,000,000 has been approved by directors of the Peninsular Telephone Co., Tampa, Fla.

Directors were told by Carl D. Brorein, president, that a desirable construction budget for the current year would involve an expenditure in new plant of approximately $9,000,000.

But after considering the program the board determined that the company could not finance the construction by the sale of its securities at terms considered reasonable, until it receives an increase in rates.

Peninsular officials said that the reduction in the current construction budget inevitably will result in a further substantial increase in waiting orders. The reduced amount of proposed expenditure can be expected to affect seriously the provision of facilities to meet the service demands of this area. Despite this, Brorein said the company will do all it can to meet increased demands for service to the best of its ability.

Peninsular directors pointed out that even with the construction that has taken place in the last few years —citing the more than $8,000,000 spent in 1951 alone—there are still 12,000 applicants for telephone service awaiting installation, with many more thousands waiting to be changed to a higher service classification.

The telephone company now employs more than 1800 people. Since the end of World War II the number of telephones in Peninsular territory has increased over 110 per cent, to the present total of 175,000. During the period the company's investment in telephone plant rose from $15,000,000 to $36,000,000.

Brorein said that the Peninsular network was the first one of its size in the nation to furnish all-dial service. He added that during the past two years equipment has been installed which permitted several exchanges to join the nationwide long-distance operator dialing network, with the remaining exchanges to be placed on a system in a few months.

At the stockholders' meeting, all directors of the company were re-elected, and the board appointed the following slate of officers: Carl D. Brorein, president; Howard P. Macfarlane, vice president; C. E. Archer, treasurer; Carl D. Brorein, Jr., secretary and James C. Handly, assistant secretary and assistant treasurer.

Springfield, Minn.

THE SPRINGFIELD, Minn., telephone exchange has been sold to the Western Telephone Co. and the new owners will take over operation from Northwestern Bell about June 1.

CLIP THIS AND STUDY

FOR THOSE WHO like odious comparisons, and to clip clippings out of the newspaper to carry around in their billfolds and purses; the following is offered for close scrutiny. Beginning in July, the Federal Government will take in taxes a sum averaging $472 for each man, woman and child in the country. Here's how that figure has grown:

1900	$ 3.88
1920	50.00
1930	25.00
1940	40.00
1950	256.00
1952	426.00
1953	472.00

It is conceded that we get more government than we used to. There is some question whether we need all we get. —*The Dallas News.*

(*Continued from page* 40)

tie should be securely fastened with a square knot.

Improvements in Drop Cable Installation Practice

SEVERAL YEARS ago, plastic insulated 5-pair drop cable was tried out in apartment and small commerical building installations. Improvements have since been made in the methods of installing the cable. A new light-weight cable has also been developed which is expected to lengthen the life of drop cable installations. This is the Ankoseal MI-611 6-pair cable with tough plasticized polyvinyl chloride jacket and 19 gauge medium-hard copper conductors insulated with polyethylene. Each pair consists of red and white conductors, the red wire being the tracer. In 5-pair terminal installations, the sixth pair is coiled out of the way for emergency use. This type of cable can be strung with somewhat less sag than required for the heavier neoprene jacketed cable where proper ground clearness must be maintained. It can be supported by means of cable grips in spans of up to 150 feet in length.

For terminating drop cable on cable terminal poles, the method illustrated in *Figure* 22 is recommended. The 10-W terminal shown is intended for use where drop wire connections are frequently changed in the cable

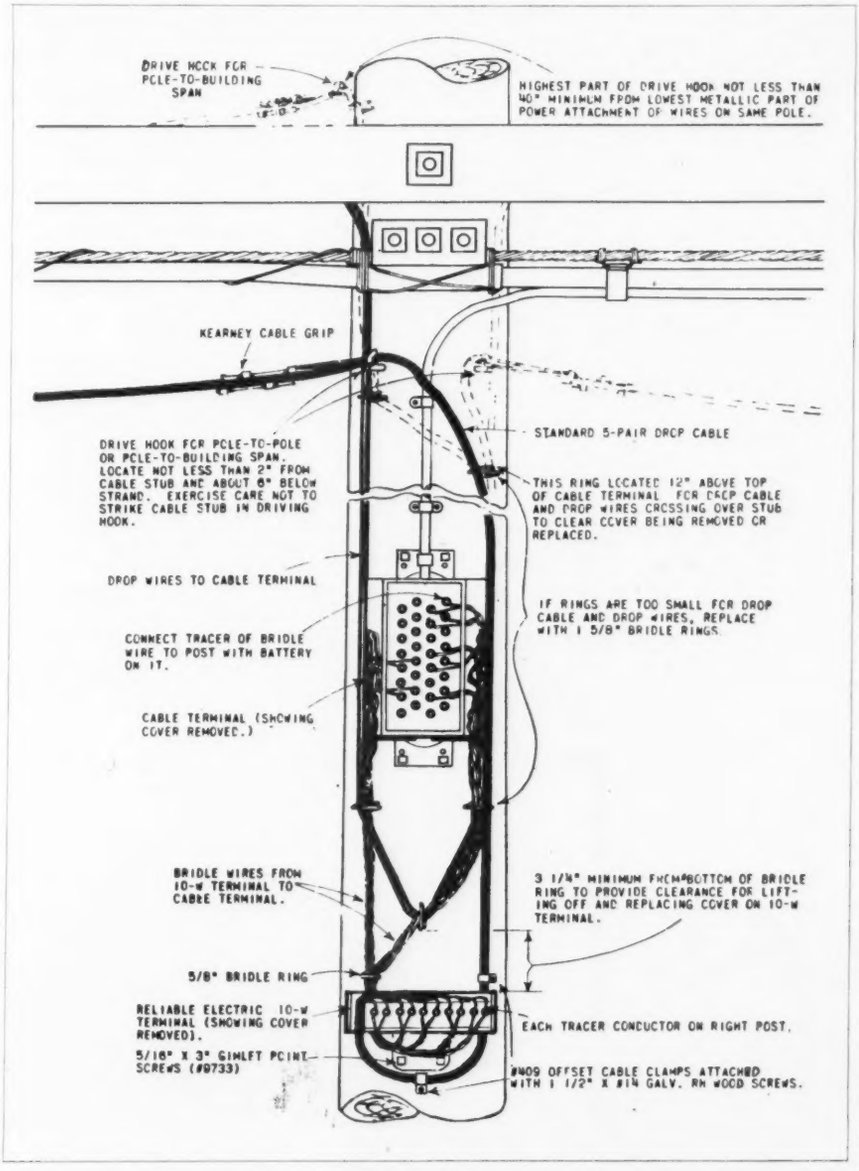
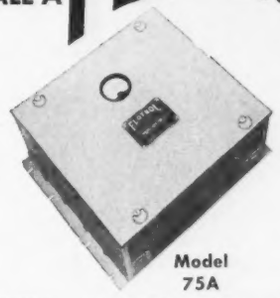

DRIVE HOOK FOR POLE-TO-BUILDING SPAN
HIGHEST PART OF DRIVE HOOK NOT LESS THAN 40" MINIMUM FROM LOWEST METALLIC PART OF POWER ATTACHMENT OF WIRES ON SAME POLE.
KEARNEY CABLE GRIP
STANDARD 5-PAIR DROP CABLE
DRIVE HOOK FOR POLE-TO-POLE OR POLE-TO-BUILDING SPAN. LOCATE NOT LESS THAN 2" FROM CABLE STUB AND ABOUT 6" BELOW STRAND. EXERCISE CARE NOT TO STRIKE CABLE STUB IN DRIVING HOOK.
THIS RING LOCATED 12" ABOVE TOP OF CABLE TERMINAL FOR DROP CABLE AND DROP WIRES CROSSING OVER STUB TO CLEAR COVER BEING REMOVED OR REPLACED.
DROP WIRES TO CABLE TERMINAL
IF RINGS ARE TOO SMALL FOR DROP CABLE AND DROP WIRES, REPLACE WITH 1 5/8" BRIDLE RINGS.
CONNECT TRACER OF BRIDLE WIRE TO POST WITH BATTERY ON IT.
CABLE TERMINAL (SHOWING COVER REMOVED.)
BRIDLE WIRES FROM 10-W TERMINAL TO CABLE TERMINAL.
3 1/4" MINIMUM FROM BOTTOM OF BRIDLE RING TO PROVIDE CLEARANCE FOR LIFTING OFF AND REPLACING COVER ON 10-W TERMINAL.
5/8" BRIDLE RING
RELIABLE ELECTRIC 10-W TERMINAL (SHOWING COVER REMOVED).
EACH TRACER CONDUCTOR ON RIGHT POST.
5/16" X 3" GIMLET POINT SCREWS (#9733)
#409 OFFSET CABLE CLAMPS ATTACHED WITH 1 1/2" X #14 GALV. RH WOOD SCREWS.

Fig. 22—Method of terminating drop cable on cable terminal pole.

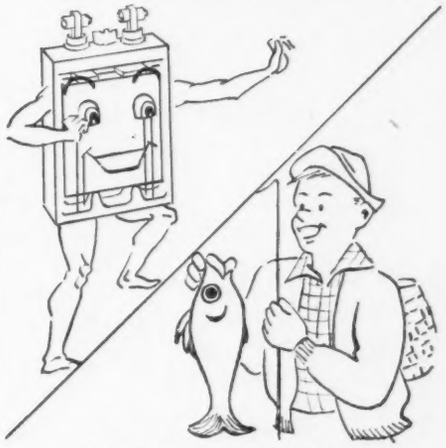
TAKE A LOAD OFF
YOUR BATTERIES

AND OFF YOUR MIND
INSTALL A FLOTROL



Model 75A

THEY'LL ENJOY THE REST



AND SO WILL YOU

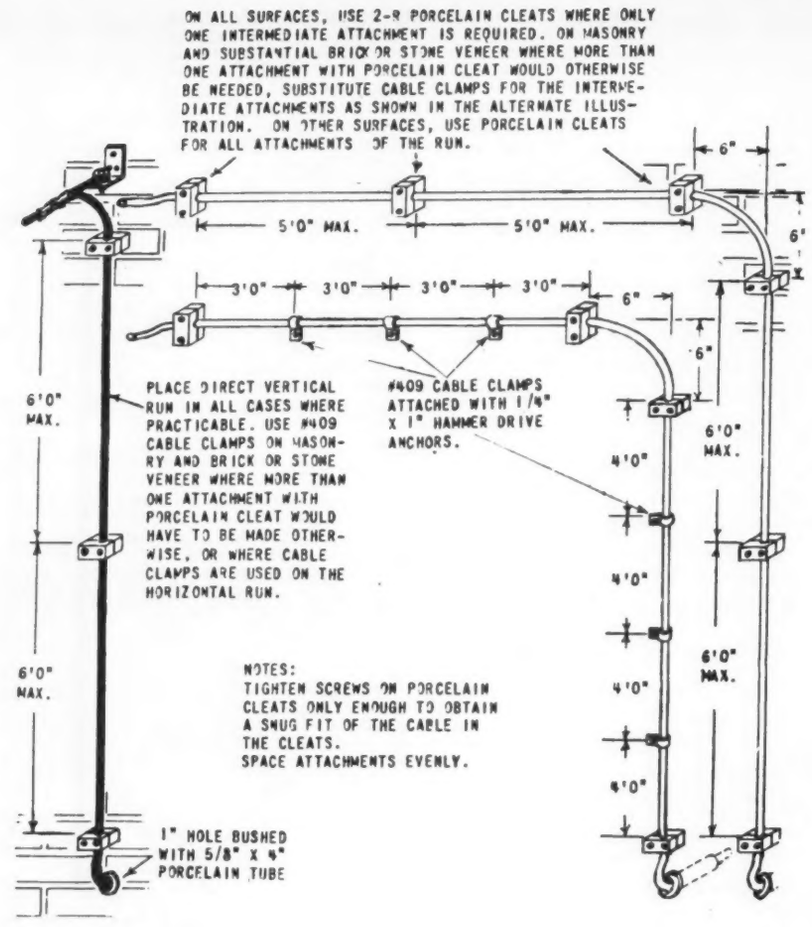
FLOTROL has no moving parts, requires no routine maintenance or adjustment; it supplies the load current as you need it, doesn't wait for the load to pull the battery down and then recharge the battery. Result—longer battery life, less power consumption, fully charged batteries all the time, and scores of maintenance man-hours saved yearly.

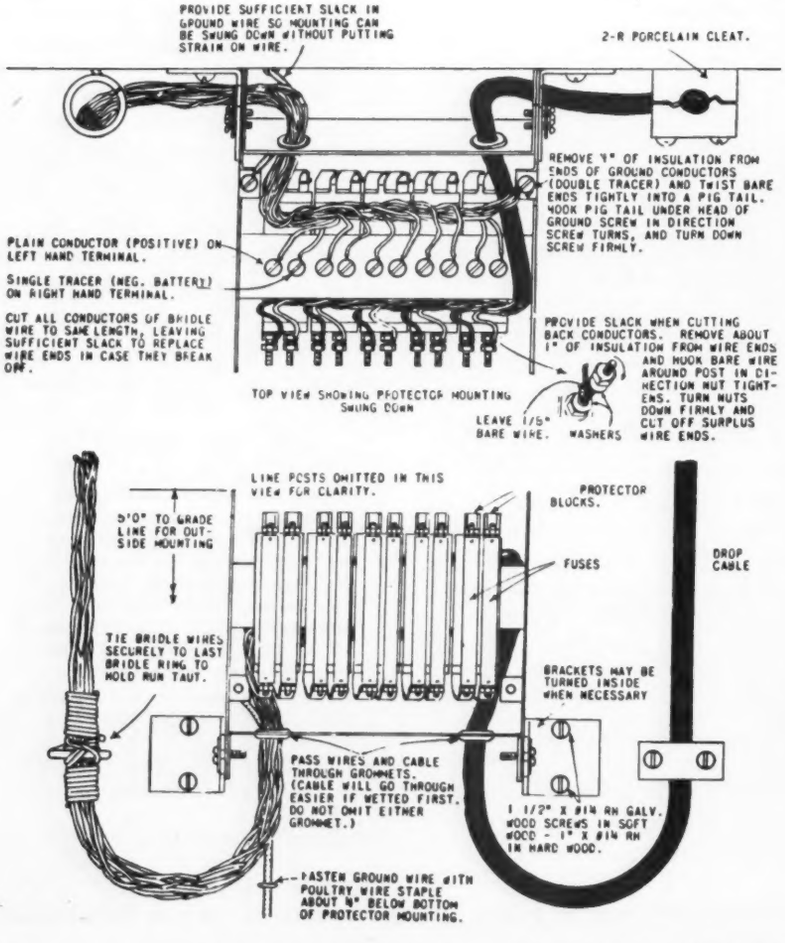
Single-phase models from 1/2 ampere to 24 amperes, described in Bulletin 160.

Three-phase models from 25 amperes to 200 amperes, described in Bulletin 161.

LORAIN PRODUCTS CORPORATION
1122 F STREET LORAIN, OHIO

FLOTROL
PARTNERS IN DEPENDABILITY
SUB-CYCLE


ON ALL SURFACES, USE 2-R PORCELAIN CLEATS WHERE ONLY ONE INTERMEDIATE ATTACHMENT IS REQUIRED. ON MASONRY AND SUBSTANTIAL BRICK OR STONE VENEER WHERE MORE THAN ONE ATTACHMENT WITH PORCELAIN CLEAT WOULD OTHERWISE BE NEEDED, SUBSTITUTE CABLE CLAMPS FOR THE INTERMEDIATE ATTACHMENTS AS SHOWN IN THE ALTERNATE ILLUSTRATION. ON OTHER SURFACES, USE PORCELAIN CLEATS FOR ALL ATTACHMENTS OF THE RUN.
5'0" MAX.
5'0" MAX.
6"
6"
3'0"
3'0"
3'0"
3'0"
6"
6"
#409 CABLE CLAMPS ATTACHED WITH 1/4" X 1" HAMMER DRIVE ANCHORS.
PLACE DIRECT VERTICAL RUN IN ALL CASES WHERE PRACTICABLE. USE #409 CABLE CLAMPS ON MASONRY AND BRICK OR STONE VENEER WHERE MORE THAN ONE ATTACHMENT WITH PORCELAIN CLEAT WOULD HAVE TO BE MADE OTHERWISE, OR WHERE CABLE CLAMPS ARE USED ON THE HORIZONTAL RUN.
6'0" MAX.
6'0" MAX.
4'0"
4'0"
4'0"
4'0"
6'0" MAX.
6'0" MAX.
NOTES:
TIGHTEN SCREWS ON PORCELAIN CLEATS ONLY ENOUGH TO OBTAIN A SNUG FIT OF THE CABLE IN THE CLEATS.
SPACE ATTACHMENTS EVENLY.
1" HOLE BUSHED WITH 5/8" X 4" PORCELAIN TUBE


PROVIDE SUFFICIENT SLACK IN GROUND WIRE SO MOUNTING CAN BE SWUNG DOWN WITHOUT PUTTING STRAIN ON WIRE.
2-R PORCELAIN CLEAT.
REMOVE 1" OF INSULATION FROM ENDS OF GROUND CONDUCTORS (DOUBLE TRACER) AND TWIST BARE ENDS TIGHTLY INTO A PIG TAIL. HOOK PIG TAIL UNDER HEAD OF GROUND SCREW IN DIRECTION SCREW TURNS, AND TURN DOWN SCREW FIRMLY.
PLAIN CONDUCTOR (POSITIVE) ON LEFT HAND TERMINAL.
SINGLE TRACER (NEG. BATTERY) ON RIGHT HAND TERMINAL.
CUT ALL CONDUCTORS OF BRIDLE WIRE TO SAME LENGTH, LEAVING SUFFICIENT SLACK TO REPLACE WIRE ENDS IN CASE THEY BREAK OFF.
PROVIDE SLACK WHEN CUTTING BACK CONDUCTORS. REMOVE ABOUT 1" OF INSULATION FROM WIRE ENDS AND HOOK BARE WIRE AROUND POST IN DIRECTION NUT TIGHTENS. TURN NUTS DOWN FIRMLY AND CUT OFF SURPLUS WIRE ENDS.
TOP VIEW SHOWING PROTECTOR MOUNTING SWUNG DOWN
LEAVE 1/5" BARE WIRE.
WASHERS
LINE POSTS OMITTED IN THIS VIEW FOR CLARITY.
PROTECTOR BLOCKS.
5'0" TO GRADE LINE FOR OUTSIDE MOUNTING
FUSES
DROP CABLE
TIE BRIDLE WIRES SECURELY TO LAST BRIDLE RING TO HOLD RUN TAUT.
BRACKETS MAY BE TURNED INSIDE WHEN NECESSARY
PASS WIRES AND CABLE THROUGH GROMMETS. (CABLE WILL GO THROUGH EASIER IF WETTED FIRST. DO NOT OMIT EITHER GROMMET.)
1 1/2" X #14 RH GALV. WOOD SCREWS IN SOFT WOOD - 1" X #14 RH IN HARD WOOD.
FASTEN GROUND WIRE WITH POULTRY WIRE STAPLE ABOUT 4" BELOW BOTTOM OF PROTECTOR MOUNTING.

terminal. This arrangement avoids damage to the individual conductors of the drop cable from the sharp ends of the drop conductors scraping on them as the wires are pulled out and re-inserted. The 10-W terminal is a type of terminal without protector blocks and ground strip.

For installing the drop cable run on the building, the methods shown in *Figure* 23 have been found especially satisfactory. A drop wire hook may be used instead of the house bracket and "S" knob shown to attach the drop cable span if the brick or stone wall is sufficiently substantial to hold the span and attachment. *Table One* specifies the types of fixtures and sizes of screws

Fig. 23 (Upper Left)—Attaching drop cable span and installing run on building.

Fig. 24 (Lower Left)—Details of installing Cook Electric Type U protector mounting and connecting drop cable in mounting.—Note: To swing out mounting, loosen all four side screws and locking plates, pull mounting forward to position where rear screws rest in slots normally used for the front screws and then swing the mounting down, using the rear screws as pivots. To restore the mounting to its upright position, swing it up and push it back so screws enter their proper slots. Fit prongs of locking plates carefully in the screw slots and turn down the screws firmly.

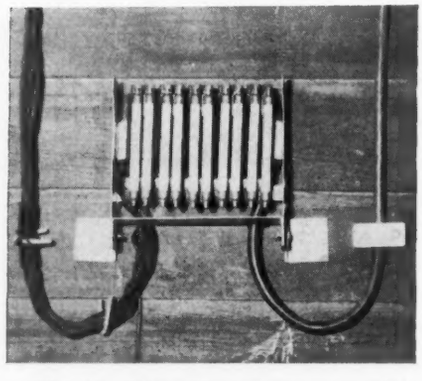


Fig. 25—Type U protector mounting installed on building wall. (This view shows the cover removed.)

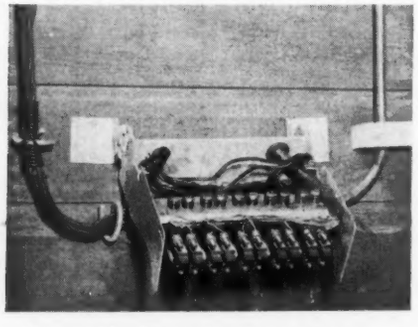


Fig. 26—Type U protector mounting in swung-down position for access to wiring.

and anchors to employ in attaching the drop cable.

Individual station protectors can be installed for each pair of the drop cable at the building termination. However, a type U protector mounting installed as shown in Figures 24 to 26 provides a neat and compact installation for outside or inside locations.

For supporting the drop cable spans from the pole to buildings or in pole-to-pole cable runs, the Kearney Lay-cit drop cable grip is well suited. It is now available with aluminum plates which makes a lighter assembly than previous styles. —THE END.

Types of Fixtures and Sizes of Mounting Screws for Drop Cable Installation on Building

Types of Building Construction	Mounting Screws or Fixtures		
	First Attachment (Primary) House Bracket with "S" Knob and 5/16" x 2" Stove Bolt	First Attachment (Secondary) and Final Attachment No. 2-R Porcelain Cleat	Intermediate Attachments (Note 1)
Frame Construction (or on Substantial Trim)	Three 2" x #14 RH Galv. wood screws	Two 2½" x #14 RH Galv. wood screws	2-R porcelain cleats
Brick Roll Siding or Stucco on Wood Sheathing (Note 2)	Three 2½" x #14 RH Galv. wood screws (Note 3)	Two 3" x #14 RH Galv. wood screws	2-R porcelain cleats
Composition Shingle Siding (Note 4)	Three 3" x #14 RH Galv. wood screws	Two 3½" x #14 FH Galv. wood screws	2-R porcelain cleats
Masonry or Substantial Brick Veneer (Note 5)	Three 1½" x #14 RH Galv. wood screws in #10-14 x 1½" lead screw (Note 6)	Two 2½" x #14 RH Galv. wood screws in #10-14 x 1" lead screw anchors	2-R porcelain cleats or #409 cable clamps attached with ¼" x 1" hammer drive anchors
Thin-Wall Brick or Stone Veneer (Note 7)	See Note 8	Two 2½" x #14 RH Galv. wood screws in #10-14 x 1" lead screw anchors	2-R porcelain cleats or #409 cable clamps attached with ¼" x 1" hammer drive anchors
Slab Veneer (Note 9)	See Note 8	Two 2½" x #14 RH Galv. wood screws in #10-14 x 1" lead screw anchors	2-R porcelain cleats
Hollow Tile	Two ¼" x 4" RH toggle bolts (Note 10)	Two ¼" x 4" RH toggle bolts	2-R porcelain cleats or #409 cable clamps attached with ¼" x 1" hammer drive anchors

Notes:—

(1) Porcelain cleats use the same mounting screws as specified under "First Attachment (Secondary)." Where a choice of porcelain cleats or cable clamps is indicated, use the clamps only when otherwise more than one cleat would have to be placed for the intermediate attachments. Porcelain cleats must be used at the ends of the run and at corners and turns in the run in order to keep the cable taut and assure a neat installation.
(2 Drill clearance holes through stucco to prevent cracking or chipping the surface.
(3) Use 3" screws if attachment can be made to both sheathing and studding.
(4) Drill clearance holes with sharp bit stock drill.
(5) Substantial brick veneer is 3¾" or thicker.
(6) On solid masonry, drop wire hook with 5/16" x 2¼" hammer drive anchor may be substituted for the house bracket and knob.
(7) Thin wall brick or stone veneer construction uses veneering less than 3¾" thick as shown by inspection at an outside corner. This class of construction also includes bricks that crack or loosen easily when drilled.
(8) Attached house bracket to substantial wood trim or to building eaves, using same mounting screws as specified for frame construction. If possible, have the screws go into a stud behind the trim.
(9) Slab veneer is 1 inch thick.
(10) Place one bolt in upper hole and other bolt in one of the two lower holes of the bracket.

Since its development over 25 years ago, *no one* has *ever* reported the failure of a Coffing Hoist hook under any load or overload. . . . And you'll find the same careful engineering for greater safety . . . the same close attention to detail in every part of a Coffing Hoist, for example:

Safety-Pull Ratchet Lever Hoists have these safety features:

- Ratchet and pawl cannot slip or drop load.
- Handle bends at point of maximum safe overload.
- Handle will not spin or fly up.
- Factory-tested at 100 percent overload.

10 sizes, ¾ ton to 15 tons

Find out more about the Coffing Safety-Pull hoists that are built stronger for safety's sake. Write Dept. U5SP.

COFFING HOIST CO.
DANVILLE, ILLINOIS

Quik-Lift Electric Hoists • Safety-Pull Ratchet Lever Hoists • Differential Chain Hoists • Spur Gear Hoists • Mighty-Midget Pullers • Load Binders • I-Beam Trolleys • Hoists-Alls.

SOLD BY DISTRIBUTORS EVERYWHERE

Measuring The Coupling Between Contiguous Telephone Circuits

(*Continued from page 44*)

Measurements made with pair 46 in service indicated that both pairs being tested must be removed from service. Due to the terminating equipment, constant results could not be obtained. Every change in the circuit leads gave a different result, only one of which approximated the result obtained on the same pair of circuits when they were not in service.

To find the performance of the equipment when the frequency of the input was varied, a number of pairs of circuits were tested. The results of several typical tests are shown in *Table III*. The coupling increases rapidly with frequency, particularly in the lower frequencies, as was expected. Due to the electrical characteristics of the loaded cable used for the experiment, the results indicate a definite "cut-off" frequency in each case, at which point the coupling begins to decrease. The few unloaded circuits available for the tests did not have a crosstalk coupling within the range of the instruments used. The top frequency in each case was the "cut-off" frequency of the attenuator at the particular amplification being used at the time.

A study was made with the input circuit connected in a constant manner, and then with the leads reversed. This was done to determine the effect of reversing the leads to the pairs being tested. The readings, taken independently, are shown in *Table IV*. Since the coupling recorded was so nearly constant, the variable resistance readings of the attenuator are also shown. This indicates a high degree of constancy without regard to the connection of the leads. This constancy was not found to be true of defective pairs, which sometimes gave readings of considerable difference.

As a check on the probability of obtaining the same coupling reading at different times, independent measurements were made on the same circuits with a lapse of several days between the tests. This comparison is shown in *Table V*. The resistance reading, as well as the coupling, is again indicated. The coupling does not necessarily remain constant over

(*Please turn to page 72*)

Table III.—Results Of Measurements With Varying Frequency

Cable 2 was used for this test.

Frequency	Coupling measured in db loss			
Powered pair	70	72	75	89
Pickup pair	71	73	76	90
500	65		65	70.5
1000	56.5	70.5	57	66
1500	55	65	56	59.5
2000	54	61	54	52.5
2500	60.5	60.5	54	49.5
3000	53	57	47	48.5
3500	49	56.5	48.5	48.5
4000	50	56	47.5	54
5000	49	55	47.5	48.5
6000	51.5	56	54	
7000	50	56	47.5	
8000		54	44	
9000		47.5	35	

Table IV.—Effect Of Reversing The Input Leads

Pair 46, Cable 1, was used as the powered circuit.

Pickup Pair	Leads in First Position		Leads Reversed	
	Resistance Reading in ohms	Coupling in db.	Resistance Reading in ohms	Coupling in db.
19	5.4	47	5.4	47
21	17.2	37	17.0	37
22	.5	66	.5	66
23	.5	66	.5	66
27	1.7	56	1.7	56
29	3.1	51	2.7	52
30	2.0	55	1.6	57
50	3.2	51	3.0	51.5

Construction
With the Double
and America's
crapo
galvanized strand
Guy and Messenger

LONG LIFE — LOW COST
The superior tensile properties inherent in steel are used to full advantage in *Crapo* Galvanized Strand. The tightly adherent zinc coating applied by the *Crapo* Galvanizing Process provides lasting protection against corrosion, prolongs the life of the strand. Controlled ductility makes *Crapo* Strand easy to work and to serve. Low first cost and low yearly cost result in important economies.
The all-round dependability of *Crapo* Galvanized Steel Strand is being demonstrated constantly by its outstanding performance in service. There is a size and grade for all practical needs.
STROMBERG Telephone CARLSON
TELEPHONES, SWITCHBOARDS · SOUND

Materials and Supplies . . .

Guarantee of Stromberg-Carlson Leading Manufacturers . . .

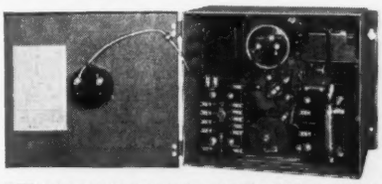
. . . bigger savings plus better service with

raytheon rectifilters*!

For more than a decade, leading independent telephone companies have found that Raytheon Rectifilters are the most economical and efficient way to supply steady DC power to PBX boards directly from an AC source.

With no moving parts, the Raytheon Rectifilter requires neither adjustment nor maintenance. It will outlast many sets of batteries, release wires carrying charging current from central office to subscribers' PBX boards for revenue producing service, and minimize power cost because of high efficiency in converting from AC to DC.

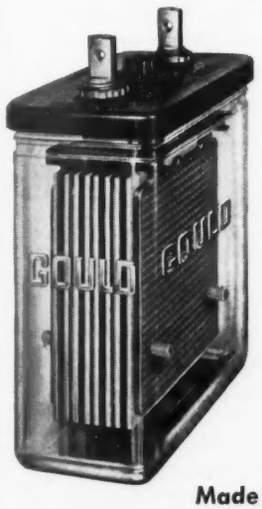
Dry disc rectifying units and other components are designed for long-life, trouble-free service. The Raytheon Rectifilter will end your telephone power problems. Just plug it in, close the door —and forget it!



RFR 1044-G RECTIFILTER WITH DOOR OPEN

*Reg. U.S. Pat. Off.

the battery that lasts practically forever



gould planté

For long life and uniform dependable service, no other telephone battery equals the Gould Planté. It has rolled up amazing performance records, remaining in active full-float service for 20 years, 30 years and longer!

In the Planté, *all* of each positive plate is pure lead, containing *no* antimonial impurities. Thus, Gould has eliminated the primary cause of self-discharge, capacity losses and shortened battery life. Planté batteries float at constant voltage and maintain rated capacity all their life. Because they almost never need service, maintenance is negligible. If you would cut battery costs to a minimum, choose Planté.

Made by GOULD-NATIONAL BATTERIES, INC.

individual station protector

reliable 955A

MFD. BY RELIABLE ELECTRIC COMPANY

- One-piece Design
- Simplified Mounting
- Asbestos Mats Eliminated

The very simplicity of the Reliable 955A is assurance of long, trouble-free service. Fuses are mounted on a one-piece, low absorption porcelain, well spaced for convenient connecting. Reliable Self-cleaning Sawtooth Discharge Blocks are standard, dissipating static without time lag or danger of grounding the line. The 955A uses No. 77L, seven ampere ceramic fuses.

"Reliable Identifies the Quality"

Distributed by STROMBERG-CARLSON

ROCHESTER 3, NEW YORK

EQUIPMENT AND ELECTRONIC CARILLONS · INDUSTRIAL INTERCOMMUNICATION SYSTEMS · TELEVISION, RADIOS AND RADIO-PHONOGRAPH

A Full 5 Inches of Body Movement
With Ease and Safety

BASHLIN'S
New Shifting Tool Dee Safety Belt

Next to Safety in the experienced lineman's book, Accessibility of Tools is of first importance in selecting a Safety Belt. This new Bashlin Safety Belt is designed with sliding tool loops . . . keeps tools within easy reach. And the built-in extra safety factor saves the Safety Strap from wear. It's Safe . . . Practical . . . Comfortable . . . and you *know* it's right. It's Bashlin.

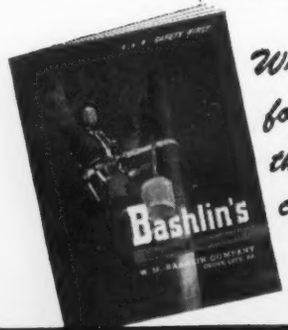
Another First

One piece aluminum sleeve adjusts from 15" to 18" in multiples of ¼". Locked in place with standard steel screws.

Comfort on the job, lightness and safety combine in Bashlin's adjustable Climber with removable gaff . . . Forged of aluminum alloy, the Bashlin Climber is lighter than conventional climbers and the *Same Strength as Equivalent Steel.* It's form fitting and has all the original Bashlin features.

No. BD 14

Removable gaff forged from alloy steel, features triple locking device with standard self-locking tested steel screws



Write for this catalog

W.M. BASHLIN COMPANY
GROVE CITY 1, PA.

Table V—Comparison Of Independent Readings On The Same Circuits

Pair 46, Cable 1, was used as the powered circuit.

Pickup Pair	First Measurement		Second Measurement	
	Resistance Reading in ohms	Coupling in db.	Resistance Reading in ohms	Coupling in db.
19	5.4	47	6.7	45
21	17.2	37	15.0	38
22	.5	66	.5	66
23	.5	66	.5	66
27	1.7	56	1.6	57
29	3.1	51	3.4	50.5
30	2.0	55	1.6	57
50	3.2	51	3.0	51.5

any period of time, as changes in the condition of the circuits being tested are likely to occur. This is particularly true of cables in which conditions are sufficiently bad as to permit audible crosstalk.

The oscillator proved satisfactory for fixed frequencies. However, much more representative results could be obtained with an oscillator of the warbler-type covering the frequencies for which the coupling measurements were desired. As mentioned before, the oscillator was used with an 18-watt amplifier. This combination proved sufficient to reach the limit of crosstalk audibility only; it would not be sufficient if one desired to measure a smaller coupling. A smaller coupling could be measured by using an amplifier with a greater output.

The attenuator described herein was found to be accurate only down to about -70 db. Since this is below the desirable coupling of -60 db for voice frequency circuits, it had little effect on this study. However, if couplings less than -70 db are to be measured accurately, an attenuator designed for the desired limits should be used. The practicable limits would depend upon the fixed resistors used in the circuit. The only other comment to be made on the attenuator is that, for accuracy, *its characteristic impedance should match that of the circuits* being tested as nearly as practicable.

The oscillograph proved very satisfactory. In the tests made, the amplifier was used at its greatest output. However, for more accurate results, it is recommended that the output of the oscillator be increased rather than that the input to the oscillograph be amplified. This point of amplification is necessary because of the undesirability of amplifying the noise on the circuit being tested, which would confuse rather than improve the accuracy of the measurements.

The type of contact required on the circuit leads depends entirely upon the type of terminal equipment at the point the tests are made. Although ordinary clips can be used under nearly all conditions, when the circuits are terminated on protectors, the work would be greatly simplified by the use of "test shoes" of a type suitable for the particular protectors involved.

The results obtainable indicate quite definitely the constancy of this method of crosstalk measurement. The results are not dependent upon the response of the operator's hearing, and the measurements obtained are quite definite as to their magnitude. The degree of accuracy appears to be quite high. Care in the selection, or in the construction, of the attenuator should result in accuracy far beyond that of any aural method employing only one or two persons.

While the equipment described could be operated by one person, the use of a second person to change the

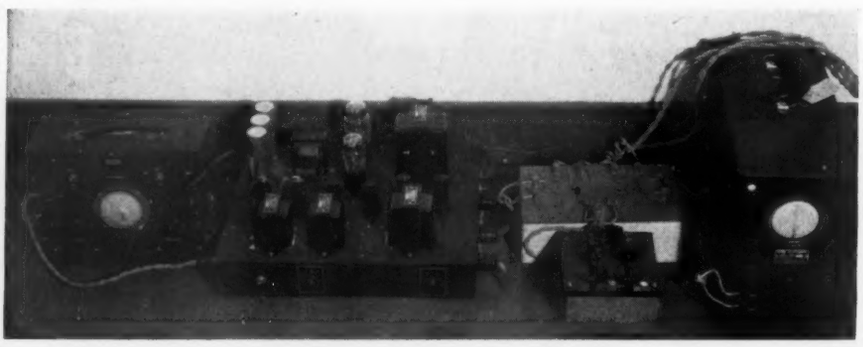


Fig. 5—Equipment Used

Professional Services

D. J. NEALE
Telephone Engineer
Complete Outside Engineering, Construction, Maintenance and Planning
Nationwide Service
Topeka, Kansas Telephone 4-2621

Installation Specialists
CENTRAL OFFICES
of all sizes
Installed - Modified - Removed
All Makes
COMMUNI-CATERING
P.O. Box 6712
CHICAGO 7, ILLINOIS

Harris-McBurney Co. *Electrical Engineers*
A complete construction service for the telephone industry
Appraisals—Reports
297 W. Mich. Ave., Jackson, Mich.
Telephone 4-6126

TELEPHONE CONSTRUCTION, INC.
Consulting, Engineering, Installation, Good Machinery, Competent Workmen
Pole Digging and Cable Splicing
C. H. DAUBENDIEK
Secretary
Box 267, Telephone 012, JEFFERSON, IOWA

SLOAN, COOK & LOWE
CONSULTING ENGINEERS
Suite 1344 120 South LaSalle Street
CHICAGO
Appraisals—Original Cost Studies
Depreciation, Financial, and Other Investigations

PATTERSON & DEWAR, Engineers
DECATUR, GEORGIA
Telephone EV 1731

CYRUS G. HILL
ENGINEER
Plant—Traffic—Commercial
Valuations and Original Cost
231 S. LaSalle St., Chicago 4

CHANABERRY ENGINEERING CO., INC.
CONSULTING ENGINEERS SINCE 1926
Complete Telephone Engineering Service
801 Realty Building—Louisville 2, Ky.

TELEPHONE ENGINEERING CORPORATION
Dallas, Texas
Consulting Engineers
Designing—Appraisals of Telephone Systems
Experienced in R. E. A. Projects, Microwave
2210 Butler Street P. O. Box 6633
Telephone LAkeside 5245

B. O. VANNORT ENGINEERS
Incorporated
Electrical—Civil—Mechanical
Telephone
A complete engineering service
700 South College Street, Charlotte, N. C.

Trowbridge Construction Co., Inc.
—Telephone—
★ Engineering ★ Construction
★ Maintenance
Backed by Years of Bell Experience
Springfield, Missouri
Telephone 2-6391

COREY STEEL COMPANY
MAGNETIC ARMCO INGOT IRON
FOR D.C. APPLICATIONS
Phone Bishop 2-3000
2800 South 61st, Cicero 50, Illinois

TELEPHONE CONSTRUCTION
Aerial Cable and Rural Plant
Station Installation—Cable Splicing
Quality Workmanship at Low Cost
Midwest Utility Construction Co.
J. W. Packer, Prior Lake, Minnesota
Tel. Minneapolis HY 2808

W. T. KING
PROF. ENGR.—TELEPHONE CONSULTANT
Engineering, Accounting, Valuations, Traffic, Depreciation Studies, Rates and General Management Services
306 So. Capitol Lansing, Mich.
P. O. Box 216 Telephone 5-1034

CARL C. CRANE, INC.
Consulting Engineers
2702 Monroe Street, Madison 5, Wis.
Experienced in REA Procedures
Preallotment Surveys—Specifications
Design and Construction Supervision

JAY G. MITCHELL
CONSULTING ENGINEER
APPRAISALS—COSTS—PLANT
7720 SHERIDAN ROAD CHICAGO
FOR MAIL BOX 523 EVANSTON, ILLINOIS

OBTAINED!
Information That Helps You Find Hidden Plant Capacity.
USE SENTINEL SERVICE TO GET MORE FROM YOUR PRESENT PLANT.
THE SENTINEL COMPANY
Telephone Efficiency Engineers
Established 1938
D. B. White, Mgr. Telephone 3742
Box 517 Fernandina, Florida

CABLE
Splicing Placing
- Excellent References
- Years of Experience
- Expert Splicers

Serving Missouri and adjoining states
DAVIS CONSTRUCTION CO., Sullivan, Mo.

SPECIALISTS O *Our 46th Year*
TELEPHONE FORMS
PRINTING • PLANOGRAPHING
YOUR ORDERS RECEIVE PROMPT ATTENTION
CULLOM & GHERTNER CO.
600 21st AVE., N. NASHVILLE 4, TENN.

MURER & SMITH
ENGINEERS & CONTRACTORS
Engineering—Construction—Installation
A complete service to the Telephone, Electrical and Pipe Line operating companies.
440 S. Brentwood Blvd. Clayton 5, Mo.
St. Louis Telephone Parkview 2747-7282

STATION INSTALLERS
Cable Splicers Construction Crews
Experienced crews for any size job
HENKELS & McCOY
6100 N. 20th St., Philadelphia 38, Pa.
Now Operating in 14 States

JOHN J. MORAN
Consulting Engineer
605 N. Maple Cookeville, Tenn.
Accounting—Appraisals—Budgets
Financing—Engineering—Rates
COMPLETE ADVISORY SERVICE

Runzel
TELEPHONE
CORDS

HAND SET CORDS

OPERATORS RECEIVER CORDS

OPERATORS BREAST-PLATE CORDS

Quality Cords...
FOR ALL MAKES AND TYPES OF INSTRUMENTS
When cord replacements are needed...
specify RUNZEL

RUNZEL
Cord and Wire Co.
1723 W. MONTROSE AVE.
CHICAGO 41, ILL.

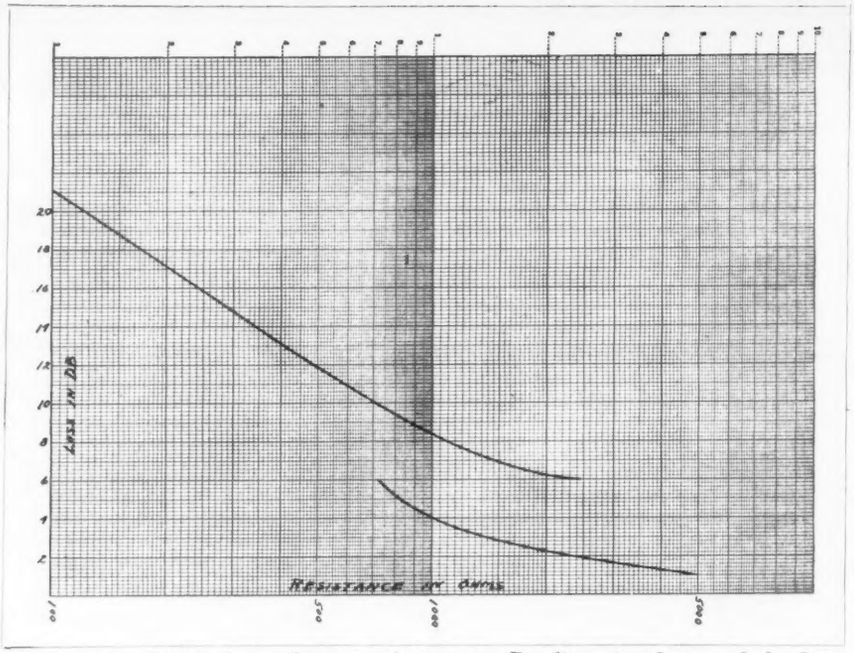


Fig. 6—The Relation Between Attenuator Readings in ohms and the Loss in db (600 ohm resistors out of the circuit under 6 db).

circuit leads greatly increases the rapidity of the measurements.

The equipment described is shown in *Figure* 5 wired for use.

Transmission Measuring

THE EQUIPMENT and method of testing just described lends itself very readily to transmission testing by the loop method. Straightaway testing presents problems which make it a less desirable application.

The equipment is used as in *Figure* 2 except that the amplifier is not needed. The losses in this instance are within the range of the other equipment described. One circuit is connected to the binding posts marked ouput and another circuit is connected to those marked input. The circuits are connected at the far end forming a loop. The loss measured is that of both circuits. By measuring several circuits in this manner, the loss of each is readily calculated.

For accurate results the characteristic impedance of the attenuator *must match* that of the circuits being tested. However, only three ranges, matching lines of 600, 1200, and 1800 ohms impedance, should be required normally to give the degree of accuracy desired. These ranges would be as follows:

Low: Nonloaded cable, and open-wire circuits.

Medium: Medium-loaded cable physical circuits; heavily loaded cable phantom circuits; and loaded open-wire phantom circuits.

High: Heavily loaded cable physical circuits, and loaded open-wire physical circuits.

The attenuator previously described comes within the range described above as medium. A continuation of the curve in *Figure* 4 to the range of transmission losses is shown in *Figure* 6. Below 6 db, the 600-ohm fixed resistors are cut out of the attenuator circuit. This point is apparent in *Figure* 6.

Reasonably accurate results in testing the other type circuits could be obtained with the same attenuator by calibrating, and using a corrected curve in lieu of *Figure* 6.

Frequency Cut-Off Measurements

BY VARYING the frequency of the output of the oscillator while measuring either the crosstalk coupling or the transmission loss, the volume of power transmitted is readily observed on the oscillograph. By noting the frequency when the deflection on the oscillograph begins to shorten, the cut-off frequency can be found. In the same manner, the frequency at which maximum transmission is obtained can be found.

The cathode-ray oscillograph can be substituted for the usual earphones on other test equipment such as the Impedance Bridge to change the method of balancing the network from aural to visual. As in the case of crosstalk measurement it is often desirable to obtain the additional accuracy provided by vision over hearing.

Conclusion

IN ADDITION to the several uses in telephone-circuit testing for a cathode-ray oscillograph described previously, it was found that, while

testing the circuits, other conditions were discovered. As soon as the oscillograph was connected to a cable pair, certain characteristics of its condition were noticeable. A normal circuit, with the oscillograph amplifier at a maximum and the oscillator off, showed on the oscillograph a deflection of 5 to 15 millimeters. Less than this, usually indicated a short circuit, no deflection at all being obtained from a dead short. Considerably greater deflection was found to indicate "foreign battery", the degree of deflection indicating the magnitude of the current being picked up from an outside source. Some instances were noted when the external voltage was hardly noticeable with the usual testing instruments. An unreadably great deflection was obtained when the circuit was open. A rapidly changing deflection, or surges, usually indicated induction from a radio-control circuit, whereas a jumpy deflection was obtained from telegraph circuit induction. A grounded pair invariably gave a deflection with accordion-like changes. Other defects in the circuit being tested were apparent only after the oscillator was turned on. For instance, it was found that open and grounded circuits registered a deflection far in excess of the crosstalk coupling, sometimes indicating an apparent coupling of as much as 15 db.

Acknowledgments

ACKNOWLEDGMENT is made to the Bell Telephone Laboratories for the use of material on the theory of crosstalk published by them and to the Signal Corps, United States Army, for the use of military communication cables.

For numerous suggestions and assistance in developing the method of measuring crosstalk acknowledgment is made to Dr. Willard H. Eller of the University of Hawaii.

The photograph of the equipment is by the Signal Corps, United States Army.—THE END.

Bibliography

Albert, A. L., *Electrical Communication*, New York, John Wiley & Sons, Inc., 1934.

Alford, R. S., "Crosstalk Measurements" *Bell Laboratories Record*, XV, (August, 1937), p. 377-381.

Amberg, F. W., "Crosstalk Poling for the Cable Carrier System", *Bell Laboratories Record*, XVII, (February 1939), p. 191-194.

Chapman, A. G., "Open Wire Crosstalk" *Bell System Technical Journal*, XIII, (January, 1934), p. 19.

Everitt, W. L., *Communication Engineering*, New York, McGraw-Hill Book Company, Inc., 1932.

Hochgraf, Lester, "Crosstalk Balancing for the Type K Carrier System", *Bell Laboratories Record*, XVII, (February, 1939), p. 185-190.

Hunter, R. N., and R. P. Booth, "Cable Crosstalk—Effect of Non-Uniform Current Distribution in the Wires", *Bell System Technical Journal*, XIV, (April, 1935), p. 179-194.

No. 3-B Transmission Measuring Set, Western Electric Co. Instruction Bulletin No. 335.

Principles of Electricity Applied to Telephone and Telegraph Work, Long Lines Dept., A. T. and T. Co., November, 1938.

News Briefs

(*Continued from page 19*)

pleted for purchase of certain telephone properties in the area.

Dr. J. J. Crouch, Glasgow, Ky., president of the South Central Kentucky Rural Telephone Co-op, said a contract has been signed for purchase of exchanges at Cave City, Hiseville, Horse Cave, Munfordville and Hardyville, Ky., from the Southern Continental Telephone Co.

The meeting at which the contract was signed took place in Frankfort, Ky., and was attended by Dr. Crouch, James Gillenwater, co-op attorney who has been conducting negotiations on the transfer for the past several months. A. W. Ross, Griderville, Ky., co-op secretary and treasurer; G. A. Klein, Cookeville, Tenn., Earle Blomeyer, Elizabethtown, Ky., and William R. Bacon, Glasgow, Ky., president, state manager and Elizabethtown manager, respectively, for the Southern Continental Telephone Co. They were joined in Frankfort by Senator Louis Cox, attorney for the company.

With purchase of the telephone systems, claimed to be the first in the nation where a rural telephone co-op has bought major existing properties, Dr. Crouch said a definite program is being launched to bring service at reasonable rates to the section served by the co-op.

EXPANSIONS:

Prophetstown, Ill.

PROPHETSTOWN TELEPHONE CO. announced that soon work will be started replacing the old manual operated switchboard of the company with a new dial system which will give Prophetstown thoroughly up-to-date service. The estimated cost of the new system will be approximately $150,000.

Hendrum, Minn.

K. P. ELLEFSON, general manager of the Norman County Telephone Co. announced that the cut over to dial

Catalog of Telephone Printed Forms

A New Book Just Published by SUTTLE

This new, big 32-page, catalog of Telephone Office Supplies will be a valuable guide to your printing purchases.

It is packed full of illustrations and explanations of stock forms for all phases of telephone accounting—from time tickets to general ledgers.

Related forms are grouped together so you can compare them and for your convenience the prices are printed right along with descriptions.

You'll find this to be the handiest supply guide ever.

If you haven't received this book yet—write for it now.

During the recent strike of employes of the Weakley County Municipal Electric System, emergency power "saved the day" for the Southern Continental Telephone Co.'s Martin and Dresden, Tenn., exchanges. Since a protracted power failure would have caused the automatic telephone exchanges at Martin and Dresden to become inoperative, W. E. Jones, district manager of the Southern Continental company, procured portable electric generating equipment. This equipment was placed at the exchanges so that it could be immediately placed in operation should an emergency arise. The above photos show: (left) the equipment housed in a tent back of the Martin office. Mr. Jones stands at the front of the tent while P. L. Summers, switchboardman for the company, kneels inside; (right) Mr. Summers and the equipment in the Dresden office.

system has been started at the company's Hendrum, Minn., exchange.

In addition to the Hendrum exchange, the company's exchanges at Perley and Ada were cutover to dial in March of 1951. When complete changeover of the rural lines at Hendrum is made the company will have completed its plant modernization program.

Gatesville, Texas

ADDITIONAL switchboard equipment and more long distance circuits have been installed at Gatesville, Texas by the Gulf States Telephone Co. The new facilities will enable the company to take care of a larger number of pending applications for service and also to handle a larger volume of long distance traffic, Manager Bill Bamburg said.

Stephen, Minn.

OFFICIALS of the Minnesota Telephone Co. have announced that the Stephen, Minn. exchange will be converted to the dial system.

Ulen, Minn.

THE TWIN Valley-Ulen Telephone Co. has completed conversion of its Ulen, Minn., exchange to automatic operation. Carroll C. Arvig, president of the company said 100 additional rural telephones may be added this summer.

Madison, Minn.

THE CENTRAL TELEPHONE Co. has started expansion of telephone facilities in Madison, Minn. The improvements are part of a $32,100 expansion program.

An additional switchboard position and 40 more switchboard lines are to be added and new cable plant is now in process of being installed on contract by the Neale Construction Co. of Topeka, Kan.

The cable work will consist of placing a total of 14,000 feet of cable, including both aerial cable and underground cable ranging in size from 26-pair cable to 606-pair cable.

ASSOCIATIONS:

Kentucky Meeting

THE ANNUAL Convention of the Kentucky Independent Telephone Association at the Phoenix Hotel, Lexington, attracted more than 165 representatives of operating companies and suppliers.

G. B. Foscue, Jr., president of the association, presided over the meeting. John Robert Jones, Attorney, Columbus, Ohio, was main speaker of the morning session. Mr. Jones told the convention, *"Further rate increases in* 1952 *are inevitable for telephone companies if they are to meet increasing operating costs and earn a sufficient return to attract new capital for expansion and improvement of their plants."*

Mr. Jones emphasized that the company that fails to anticipate its needs for re-pricing its services in advance may find itself faced with a serious problem.

"Justice delayed is justice denied," he said. "The alert management can do much in the solution of this problem by the proper timing of necessary rate applications, and by seeking sufficient rate increases to meet the revenue requirements of the company so as to avoid repeated applications."

Stating that most telephone people realize the importance of their relationship with the regulatory agencies, Mr. Jones commented—that—"of equal importance is their attitude toward the public in the preparation and presentation of rate cases."

"After the necessity for, and the timing of the case is decided," he said, "after the amount required is determined, the case must be prepared for presentation to the commission, and what is equally important, the case must be prepared for presentation to the public. It is highly desirable that before any new rate case is filed, all representatives and employees of the company who have any contact with the public, should

be fully informed with respect to the proposed filing and the reasons therefore.

"Our own people, if fully advised, are our best representatives in selling our case to the people we serve. Of course, public officials in the communities served by the company must be informed and advised of the proposed application. In addition, key business men, chambers of commerce, civic organizations and other representative citizens should be informed of the application and of the factors requiring the re-pricing of service. Time and effort spent on such a program not only pays dividends in the field of public relations, but in addition, a great deal of the opposition now encountered and that which may develop in the rate proceedings because of lack of understanding, will be avoided."

Mr. Jones stated that along with the failure of some companies to ask for sufficient rate increases when preparing rate applications is the reluctance of many managements to believe what cost of money experts tell them as to what they require in a rate of return.

"Of course," he said, "some commissions still retain the obsolete 6% rate of return, and ignore the clear and indisputable evidence that a higher return is required. Ultimately such rulings will be reversed by higher authority. Such rulings fail to recognize the fundamental distinction between the terms 'fair rate of return' and 'cost of money.'

"In fact, they do not reflect adequately the bare cost of money. You will go a long way before you will find a competent and honest cost of money authority who believes that an Independent telephone company can long operate successfully on a rate of return of less than 7%. It is significant, that the Congress of the United States, after extensive hearings, by statute determined that a telephone company would not have excess profits until it had earned 7%. Of course, you will find some witnesses appearing as cost of money experts for the opposition who will testify contrary to this. I think in most instances you will find these witnesses to be honest and sincere men testifying as to their true beliefs.

"However, in most such instances, I also think that a careful examination of their qualifications and experience will disclose that they are totally unqualified to testify on the subject of cost of money. I think you will also find that such testimony is based on theory and not on practical experience. In such instances, a well

ACORN INSULATED WIRE

Quality WIRE for Every Telephone NEED

DROP WIRE
BRIDLE
SWITCHBOARD
TREE
GROUND
BURIED WIRE

INTERIOR
POTHEAD
CABLE TERMINAL
INSTRUMENT
FIXTURE
PLASTIC INSULATED

ACORN INSULATED WIRE COMPANY, INC.
36 Freeman St., Pawtucket, Rhode Island
LEICH SALES CORP., 427 W. Randolph St., Chicago
LINDSAY TELEPHONE SUPPLY CO., 7016 Euclid Ave. Cleveland, Ohio

ACORN'S exclusive Carton packaging preserves carefully developed QUALITY until installed . . .

Drop Wire—Bridle—Interior—Tree—Ground—Switchboard—Pothead—Cable Terminal—Instrument—Fixture—Buried Wire

Save Money on All Pulling or Lifting Operations With a KEARNEY LINE PULL-R

4 capacities—from ¾ to 6 tons.

Do the Job Better . . . Faster . . . and More Safely

The Kearney Line Pull-R is a lightweight, low-cost general utility tool — designed to handle almost any pulling or lifting operation . . . efficiently and with a minimum of effort.

Built of high-grade aluminum alloy — with HERC-ALLOY flexible, welded chain as standard equipment — the Kearney Line Pull-R is one of those all-purpose tools your workman can immediately put to good use.

Lifetime lubricated . . . the mechanism and automatic brake are fully enclosed. The flexible chain can be stored in a minimum of space.

By eliminating dangerous, slow, makeshift methods . . . the Kearney Line Pull-R soon pays for itself. It materially increases the safety factor on any job you do.

It all adds up to a profitable addition . . . when you place a Kearney Line Pull-R in your lineman's truck.

JAMES R. KEARNEY CORPORATION ST. LOUIS, MO.

For complete information including weights, sizes and prices, write for Bulletin No. 18-45.

JAMES R. KEARNEY CORPORATION
4224-42 Clayton Avenue, St. Louis 10, Mo.
Canadian Plant: Guelph, Ontario

195

KEARNEY Gives a Little More for a Little Less Through Engineering

DISTRIBUTED BY KELLOGG SWITCHBOARD AND SUPPLY COMPANY
DROP • ENDURPRENE • BRIDLE
MANUFACTURED BY GENERAL INSULATED WIRE WORKS, INC., PROVIDENCE, R.I.

prepared, detailed and searching cross-examination is required."

At the afternoon session, Mrs. Mayme Workman, executive secretary and treasurer, Independent Telephone Pioneer Association, Springfield, Illinois, talked on "Traffic Truths and Fallacies." "The fundamentals of telephone never change. They are the same today as they were in 1907 when I started in the telephone industry. The objective of the telephone company and its employees in the early 1900's was to render courteous, prompt and dependable telephone service, and this is our objective today," Mrs. Workman said.

Frank M. Malone, vice-president, Southern Bell Telephone & Telegraph Co., Atlanta, Georgia, discussed "More and Better Friends." Mr. Malone stated that since the telephone industry was faced with so many problems, especially those having to do with rate increases, "held" orders for telephone service and applications for regrades of service, it is of increasing importance that the telephone business have more and better friends, or as he paraphrased it—the importance for the industry to do a real public relations job.

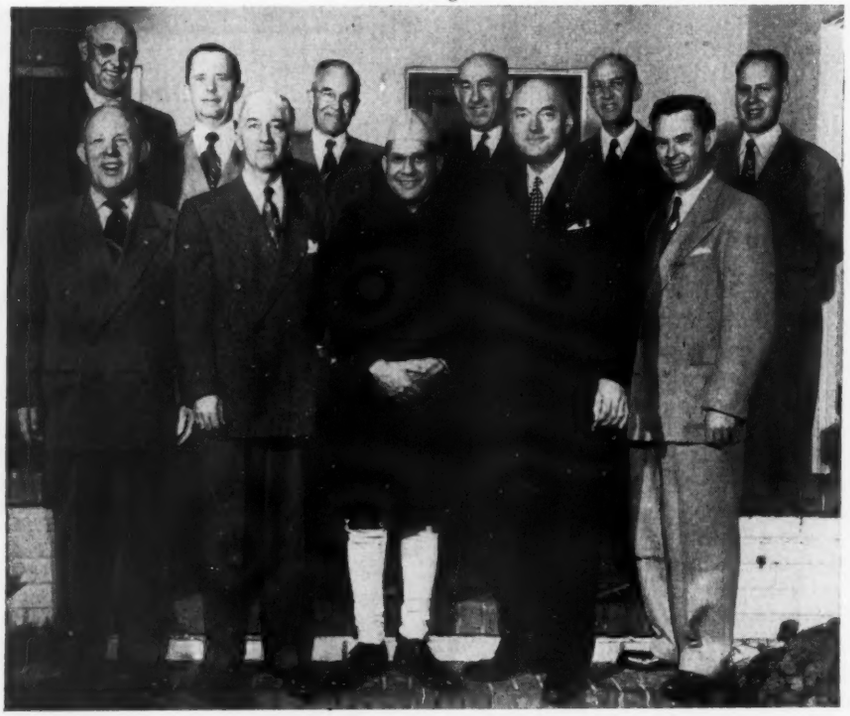
"Public relations," he said, "is a long-term thing and a constructive thing. It is a builder, not merely a mender, and involves not only telling the public about a business but actually making the business '*Live Right.*'

"Although we people in the telephone business have done a very good job of 'living right' we nevertheless have borrowed heavily against that reservoir of good will, built up primarily by rendering a high quality of service, which through the years has stood us in such good stead."

Mr. Malone stressed that a public relations program requires a lot of human effort.

"The American people," he said, "have been led to expect a great deal from our business, your company and my company. They expect more efficiency, greater ingenuity and resourcefulness than from most other businesses. We, ourselves, haven't discouraged that opinion. Surely we would never want to do so—on the contrary, we must strive in every way to continue to merit that feeling.

"So we must analyze the job to be done. We must be realistic in our



The vast sub-continent of India, seeking to modernize and expand its telecommunications facilities and operations, has availed itself of United Nations' assistance in sending to this country Ramchandra Vaish, Deputy Director of Posts & Telegraphs. The above photo shows Deputy Director Vaish during a recent visit with officials of the Associated Telephone Co., Ltd., Santa Monica, Calif. Front row (l. to r.) T. A. Osborne, general plant superintendent; Harlan W. Holmwood, vice president; Mr. Vaish; Edwin M. Blakeslee, president; Marshall K. Taylor, attorney and personnel manager. Back row: G. T. Ellis, general auditor; Owen G. Jarboe, general traffic superintendent; Ernest W. Watson, general commercial superintendent; R. D. Collins, Western district manager; Dean M. Barnes, vice president and chief engineer; Grant Smith, supervisor of information.

appraisal of where we stand today in the eyes of the public. And having arrived at that decision, set our course of action in the most constructive and aggressive manner possible."

Mr. Malone emphasized that the industry must tell the public "over and over again", as simply and clearly, as interestingly and convincingly as "we know how, that this business has four major concerns"—(1) the best possible service; (2) the lowest possible cost; (3) keeping the business financially sound; and (4) providing fair treatment of employees."

"The character, experience and the wisdom with which these problems are administered will be the test of our success," he stated. "If we continue to deserve and have public confidence, we will continue to have freedom to do our job well. If we fail in character or wisdom to deserve and hold this public confidence, we will be hampered by rules and regulations to such an extent as to lose control of our business. . . ."

QUOTES

"Proponents of the Hell's Canyon dam project should examine and explain fully the reason why Congress must continue to appropriate funds for the Tennessee Valley Authority while it is continually cited as a Utopian accomplishment for the benefit of the people. Last week, Congress slashed $14,757,000 in committee from the budget appropriation for TVA and then another $14,000,000 on the floor of the House where the huge experiment in government ownership and operation was tagged under the appropriate name of 'socialistic'." — *Jerome (Idaho) North Side News.*

Kelly McNish, Bristol, Tenn., president of Inter-Mountain Telephone Co., and director of the United States Independent Telephone Association, talked on—"*Let's Face Facts.*" Mr. McNish warned the delegates that as a regulated business the telephone industry should strongly oppose the leving of any further taxes against it.

The evening session was highlighted with the Annual Banquet, with entertainment furnished by Bob Lewis, star of stage and television in "Comedy Magic," and music by the Dave Parry Trio.

The manufacturers were well rep-

LOWELL insulated wires

drop wire and inside telephone wire

Neoprene Jacketed Drop Wire for the toughest assignments and highest performance standards, with adhesion capable of withstanding great stress. Premium grade materials and extra care in manufacturing and testing assure the user of drop wire which is highly resistant to compression and abrasion. Write us today for samples, prices and technical data.

All Lowell Telephone Wire is thoroughly tested for physical and electrical characteristics in completely equipped, modern laboratory and inspection departments, and manufactured under rigid quality control.

INSULATIONS of rubber or plastic.

OUTER COVERING of neoprene, rubber or plastic jackets.

CONDUCTORS of copper, bronze or Copperweld.

A complete line of Insulated Telephone Wire—outside or inside.

LOWELL

BEHIND THIS DOOR IS MADE

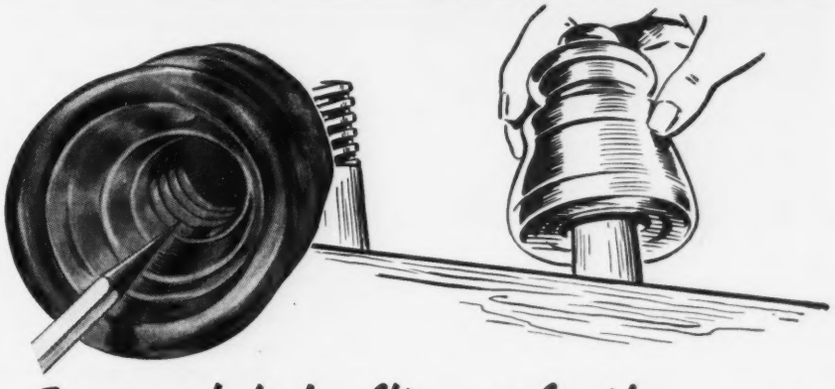
INSULATED WIRE DIVISION

OF THE OVERLAKES CORPORATION

LOWELL, MASSACHUSETTS, U.S.A.

Distributed by

TELEPHONE REPAIR & SUPPLY CO. • 1760 Lunt Ave., Rogers Park Station, Chicago 26, Ill.



Every pinhole fits perfectly . . .

Armstrong's Glass Insulators are hand-gauged at the factory to insure uniform accuracy of thread contour. This means they won't rock or wobble on the pins—you get a sure, snug fit every time.

Their great mechanical strength recommends these rugged insulators for duty where service conditions are severe. They'll resist extreme temperatures and sudden thermal shocks—support abnormal loads that are heavy enough to bend standard metal mounting pins.

Your distributor will be glad to explain how Armstrong's Glass Insulators can help you cut maintenance and replacement costs. Get in touch with him today or write direct to Armstrong Cork Co., Glass and Closure Div., 295 Fifth Avenue, New York 16, N. Y.

ARMSTRONG'S GLASS INSULATORS

for communications . . . for power

When Life's at Stake Rely on...

KLEIN

Show the familiar Klein trademark to the old-timer on the pole and he'll tell you—"that's the equipment I've been using ever since I was a grunt."

Yes, workmen just naturally feel safer when the equipment is Klein—recognized for quality "Since 1857."

ASK YOUR SUPPLIER
Foreign Distributor: International Standard Electric Corp., New York.

Write for your free copy of the Klein Pocket Tool Guide today!

Since 1857

Mathias KLEIN & Sons
Established 1857 — Chicago, Ill., U.S.A.
3200 BELMONT AVE., CHICAGO 18, ILL.

resented with 15 companies out of a membership of 24 having their display exhibits adjoining the convention room. Their "wares" were most interesting and well received by the telephone people attending the convention.

The announcement of the following officers of the association for the 1952-1953 term was made at the banquet: H. J. Huether, Jr., Lexington, president; Louis Cox, Frankfort, vice-president; G. B. Foscue, Jr., Florence, vice-president; W. R. Bacon, Glasgow, vice-president; and M. V. Shepherd, Ashland, secretary-treasurer.

Members of the board of directors are: W. R. Bacon, Glasgow; Earle Blomeyer, Elizabethtown; Louis Cox, Frankfort; G. B. Foscue, Jr., Florenc; H. J. Huether, Jr., Lexington; D. H. Lloyd, Lexington; B. LaBaron, Lexington; H. S. Poage, Augusta; and M. V. Shepherd, Ashland.—THE END.

BENDIX RADIO: New Mobile Equipment

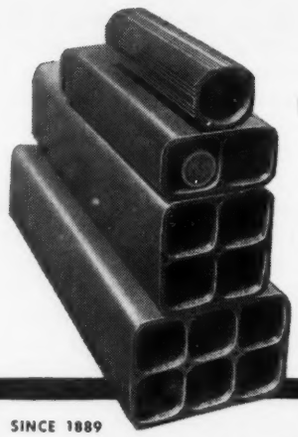
Bendix Radio recently announced continuous production of a completely new line of railroad and mobile equipment. Designed for operation in the 152-174 megacycle band, the new VHF equipment can be packaged either in three unit housing or a single compact case. The two versions, one of which is known as the "Railmaster" and the other the "Trafficmaster" are electrically identical. The "Trafficmaster" is interchangeable with the Bendix MRT-5.

The "Railmaster" which has been designed especially for railroad use consists of individual plug-in transmitter, receiver and power supply, mounted on a sturdy shockmount. Swivel type inject-eject mechanisms on the shockmount permit easy installation and insure positive mating of plugs. The Hammerloid finished dust covers are easily removed by two quarter turn wing screws.

Bendix is providing the equipment with a choice of transmitter power—2½, 12, 25, or 35 watts. In addition, fixed stations can transmit up to 60 watts. The transmitter consists of basic exciter chassis with interchangeable power amplifier decks which, when operated with appropriate power supply, can be replaced at any time to increase power as desired. Dual channel operation can be provided by insertion of sealed plug-in relay and crystal. Frequency stability is 0.0006% with crystal type oven and .0025% without oven.

According to R. B. Barnhill, Com-

(*Please turn to page* 82)



SINCE 1889

NATCO
CLAY CONDUIT

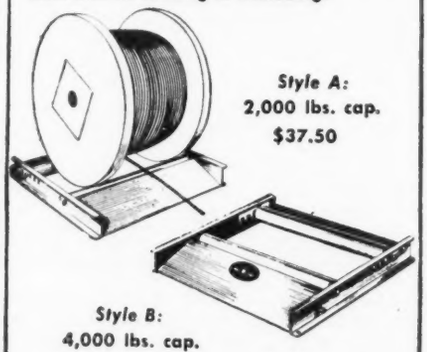
The proved and standard Protection for Underground Telephone Cables.
Cheapest in the long run. Highest quality and a full line of shapes.

National Fireproofing Corp.
327 FIFTH AVE.
PITTSBURGH 22, PA.

Balls REELY roll on ROLL-A-REEL

Go modern . . . save time . . . save labor . . . save cost.

ROLL-A-REEL
enables you to reel or unreel wire, cable, rope . . . easily, quickly . . . economically.
Adjustable slots for wide variety of reel sizes. Strong . . . with low slanted front and positive front lock for loading or unloading.



Style A:
2,000 lbs. cap.
$37.50

Style B:
4,000 lbs. cap.
$75.00

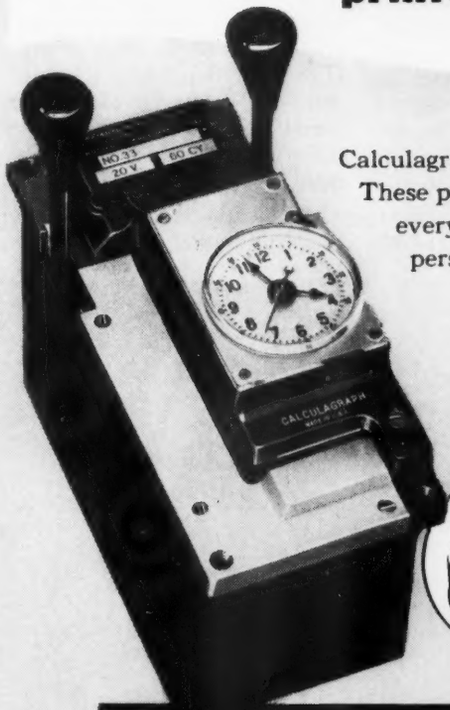
• *PROMPT DELIVERY: ORDER NOW!*

ROLL-A-REEL
327 West Fourth St. Cincinnati 2, Ohio

If your toll call revenues depend on PENCIL work!

CALCULAGRAPH

V is one sure way to collect all the revenue due with accurate, automatically calculated, printed toll time records



Calculagraph printed elapsed time records are accurate to the second. These precise printed records assure collection of all the revenue due every toll call. Automatically computed, they relieve switchboard personnel of time-consuming detail work that slows switchboard service. Calculagraph is the engineered, revenue-vital equipment that no exchange—large or small—can afford to overlook. Available for switchboard or portable mounting, they are fully described in four illustrated catalogs. Write for yours, now, on company letterhead.

COMPLETELY ACCURATE TO THE SECOND
AUTOMATICALLY COMPUTES ELAPSED TIME
PRINTS THE RECORD FOR PERMANENT FILING
FACILITATES SWITCHBOARD SERVICE
OPERATES SILENTLY

CALCULAGRAPH COMPANY · INC

HARRISON • NEW JERSEY

THE STANDARD FOR ACCURACY SINCE 1892

mercial Sales Manager, exceptionally clear transmission is assured in the new equipment through the use of the exclusive Bendix phase modulator and modulation limiting circuits.

Mr. Barnhill also added that a unique feature of the equipment is that while it is supplied for adjacent channel operation on the present 60 kilocycle allocation plan, the receiver can be adapted for operation on the proposed 30 kilocycle spaced channels or even 20 kc by replacement of the easily interchanged filters. As with the transmitter, operation on two channels may be provided initially or added in the future by the insertion of sealed plug-in relays and crystals.

The operation of the Cook Research Laboratories has required double its former space which has been made available by the building of new and larger quarters located in Skokie, Ill. Cook Research Laboratories, a division of Cook Electric Co., was formerly located in Chicago.

GOULD-NATIONAL: Free Reprint

GOULD-NATIONAL Batteries, Inc., Trenton 7, N. J., offers a four-page reprint of an article on the new battery-plate alloy, lead-calcium. Batteries comprising this new plate are now being produced for telephone, power plant, and alarm system applications. The article, "Lead-Calcium for Storage Batteries", was written by U. B. Thomas, Jr., member of the Technical Staff of the Bell Telephone Laboratories, Inc.

Including four graphs giving laboratory test data, the write-up reports on the experiments leading to the development of lead-calcium for battery-plate grids. The grid is the plate framework onto which is impressed paste forms of lead peroxide (positive plate) or lead (negative plate). (The lead peroxide of the positive plate and the lead of the negative plate react chemically with the sulphuric acid of the electrolyte, and electrified particles are set in motion, resulting in an electric current.) The use of lead-calcium results in stronger grids, reduces the rate of battery self-discharge, and decreases the current required to keep stationary batteries fully charged.

The article describes self-discharge in batteries with the older lead-antimony grids and shows why it is reduced 80% by using lead-calcium grids. It relates how stibine (antimony hydride) was discovered in the air of a telephone battery-room and tells how this discovery revealed information on the electrochemistry of storage batteries. Continuing, the article describes the procedures followed in analyzing industrial atmospheres and in measuring battery self-discharge. Next, the write-up gives details on the mechanical properties of lead-calcium and explains why grids of this alloy are not weakened in use, as are those of lead-antimony.

For copies of this article write Gould-National Batteries, Inc., Trenton 7, N. J.

SUTTLE EQUIP. CO.: New Catalog Offered

THE SUTTLE EQUIPMENT CO., Lawrenceville, Ill., recently released Catalog No. 73 covering the Suttle line of accounting forms and printing supplies for Independent telephone companies. The 36-page catalog was published by the Suttle Company after many months of steady research on the 12 new forms that are presented.

According to M. Shaw, manager of the Suttle Printing Department,—

Carl O. Wright, recently appointed staff engineer for Automatic Electric Sales Corp. (For complete story see p. 32, May, Fortnightly Telephone Engineer)

J. A. "Jim" Bardsley, recently appointed assistant to the vice president in charge of sales of the Highway Trailer Co., Edgerton, Wis.

Sidney R. Curtis, of the Stromberg-Carlson Co., Rochester, N. Y., has been appointed vice president in charge of government contracts.

Coit V. Henley, formerly of the installation department, has been appointed sales representative for the telephone division of the Stromberg-Carlson Co., according to T. C. Thompson, Telephone Sales Manager. Mr. Henley will cover Idaho, Utah, Montana, Eastern Oregon, and Eastern Washington, replacing Robert H. Wallace who is presently on leave due to ill health. He will report directly to Joseph Galligan, manager of the San Francisco branch of the company.

"These stock forms have to fit in with general accounting practices and they have to be efficient in use. We checked hundreds of forms in use and from them built up what we thought was the ideal form for each required-record problem, so it could be used almost universally."

Mr. Shaw stated that: "The forms are not offered as any sort of accounting system in themselves, but they do cover an assortment of well designed paper work 'tools' of the kind that are necessary to accumulate data to support the specified accounting systems as set up by the various commissions. We believe they are better 'tools' than most of those now in use . . . In other words, there was a great deal of product engineering back of this book, so we could offer our telephone friends stock paper forms that will do the best job, and can also be bought at stock form prices. . . .

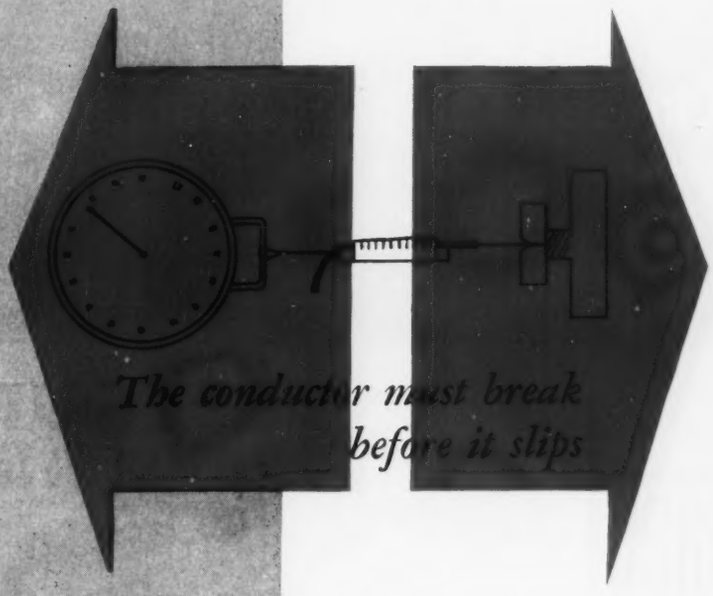
Copies of Catalog 73 may be obtained by writing M. Shaw, Suttle Equipment Co., Lawrenceville, Ill.

INET, INC.: Battery Charger

A COMPLETE line of heavy duty, high capacity regulated battery chargers designed to answer the spe-

ALPHADUCT

P clamp adhesion test



P clamps are the most widely used method of attaching drop wire to buildings. Lest you may worry about a P clamp causing slipping of the insulation or jacket on Alphaduct Neoprene Jacketed Drop Wire — read about this Alphaduct service test. This test is made daily.

A sample of Alphaduct wire is inserted in a P clamp with 12 inches of the wire projecting from the top of the clamp. The bail of the clamp is then inserted in the upper jaws of a tensile testing machine, and the end of the wire is stripped free of jacket and insulation and inserted in the other end of the machine.

The jaws of the machine are then gradually separated until the conductor breaks. The conductor must break before there is ANY slipping of either the jacket or the insulation.

Don't have any worries about a little old P clamp hurting ALPHADUCT drop wire. Try Alphaduct. It's dated by a color coded thread so you can see for yourself how long it lasts, how much money it saves.

ALPHADUCT WIRE AND CABLE COMPANY • MILLTOWN, NEW JERSEY
NATIONAL DISTRIBUTORS • LEICH SALES CORPORATION, CHICAGO, ILLINOIS
REGIONAL DISTRIBUTORS • PANKEY SUPPLY CO., CHARLOTTESVILLE, VA.
THE LINDSAY TELEPHONE SUPPLY CO., CLEVELAND, OHIO

Servicing the
INDEPENDENT
Telephone Industry

A
Complete Line of
Telephone Supplies

•

Lindsay Telephone Supply Co.
Telephone ENdicott 1-0110 7016 Euclid Avenue
CLEVELAND, OHIO

PERSONALIZED SERVICE

TELEPHONE
CORDS

FOR QUALITY,
SERVICE,
ECONOMY,
PROMPT
DELIVERY

Assurance of long life and trouble-free conductivity. For all makes and types of telephone instruments.

Write for catalog and samples

COMMERCIAL
CORD & SUPPLY CO.
INC.
26 East Main Street
CLIFTON SPRINGS, N. Y.

Phone CLIFTON SPRINGS 189

STRENGTH, ENDURANCE
that Meet the Test!

Crapo
GALVANIZED
Guy and Messenger Strand

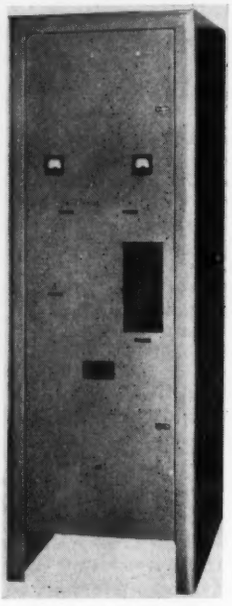
IN THE FIELD as in laboratory tests . . . Crapo Galvanized Steel Strand proves itself capable of withstanding severe punishment. Steel's inherent strength and durability are combined with definite economies in every size and grade of Crapo Steel Strand. You'll find the heavy, ductile, tightly-bonded zinc coatings, applied by the famous Crapo Galvanizing Process, provide lasting protection against corrosion.

Contact your jobber of Crapo Galvanized Products or write direct for further information!

INDIANA
STEEL & WIRE COMPANY
MUNCIE, INDIANA

cial needs of the telephone industry is now being manufactured by Inet, Inc., Los Angeles, Calif. The equipment utilizes selenium rectifiers with magnetic amplifier controls to safeguard and extend the life of the batteries as well as provide low cost automatic operation. Units are available in sizes from 25 through 1200 amperes and voltage ratings up to 60 volts D.C.

According to the manufacturer, extremely fine regulation to better than plus or minus 0.5% from no load to full load with up to plus or minus 10% A. C. line variation offers full



New line of battery chargers is available in sizes from 25 to 1200 amperes and voltage ratings up to 60 volts D. C.

protection to the batteries. This regulation is held under emergency operation with frequency variations of better than plus or minus five cycles. An automatic current limiting feature prevents overloading. The manufacturer states response time under extreme load changes is very fast and that the equipment is extremely quiet since ripple is filtered to 0.1% RMS.

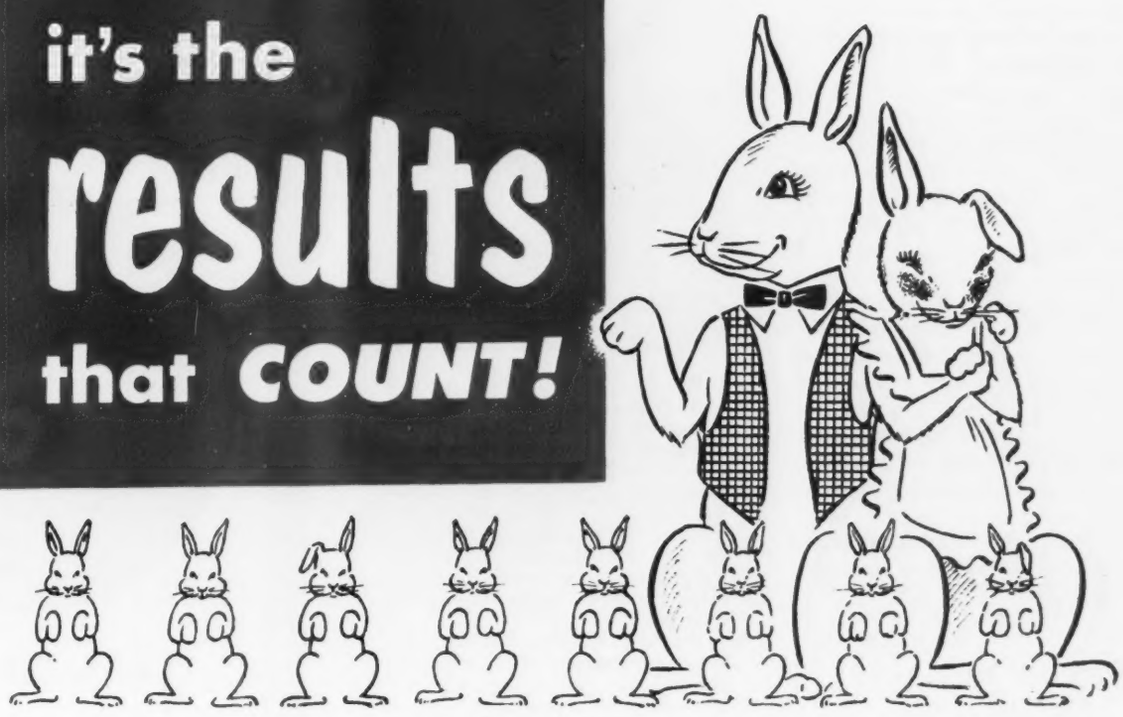
For complete information write NEW PRODUCTS' EDITOR, Telephone Engineer Publishing Corp., 7720 N. Sheridan Rd., Chicago 26, Ill.

GOULD-NATIONAL: New Plastic-Cased Batteries

GOULD-NATIONAL BATTERIES, Inc., Trenton 7, N. J., has announced a new line of plastic batteries for use in telephone installations, alarm systems, power-plant control systems, and other applications where batteries are used for stand-by emergency power. Because of their light weight, the plastic-cased batteries are also being manufactured for aircraft use.

The new line is available over a wide capacity range—from 10 am-

it's the results that COUNT!



—— results Our customers—whether large or small—have derived *Consistent Maximum Revenue* from directory advertising—giving them extra operating revenue and extra profits.

—— results Our customers have been *Favorably Impressed* by the *Meticulous Care*, the *Proper Attention*, and the *Satisfactory Service* that our company has given to their directory problems.

—— results Our customers have been able to rely on us to *Maintain* the *Best Public Relations* among their subscribers. A *High* degree of *Accuracy* is our constant aim on every directory.

TELEPHONE DIRECTORY ADVERTISING EXCLUSIVELY

L. M. BERRY AND CO.

Hulman Building, Dayton 2, Ohio • Telephones Michigan 7421-L.D.16

BRANCH OFFICES in: Birmingham, Alabama • Bristol, Chattanooga, Memphis and Nashville, Tennessee • Harrisburg, Pennsylvania • Jackson, Mississippi • Kansas City, Kansas Louisville, Kentucky. • Milwaukee, Wisconsin • New Orleans, Louisiana • Rochester, New York • Tampa, Florida • Warsaw, Indiana

pere hours to 100 ampere hours (at the 8 hour rate of discharge).

The polystyrene containers are 40% lighter in weight than conventional containers, are smaller in overall dimensions, do not react with electrolyte, are transparent (giving visible indication of electrolyte level), and have better shock resistance than do glass containers.

Of special importance, today, is the fact that the styrene material is now more available than other container materials. Also, plastic containers can be produced three to four times as fast as those of glass. Containers are produced at intermediate molding pressures and temperatures (500-650F) and, of course, require no curing as in the case of rubber containers. Another production advantage of the plastic container is the ease with which it can be formed into intricate shapes and contours. It is expected that eventually this type of container will be used for many other types of batteries.

For additional information write to Gould-National Batteries, Incorporated, Trenton 7, N. J.

RAYTHEON MFG. CO.: Search For Oldest "RectiChargeR"

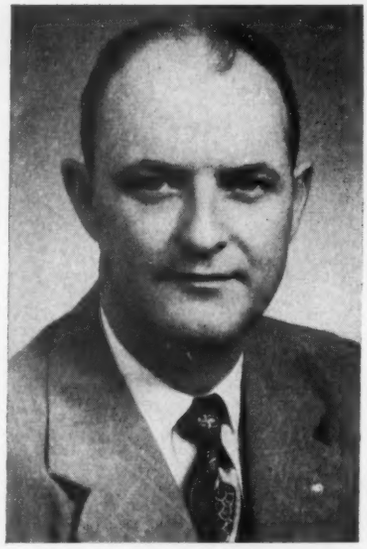
AN INTERESTING nation-wide search for the oldest "RectiChargeR" now in actual use has been announced by the Raytheon Manufacturing Company, Waltham, Mass.

One interesting feature of this search is the fact that Raytheon has been producing a line of "RectiChargeRs" since 1935. Later this line was extended to include "RectiFilteR" battery eliminators, and more recently the new "RectiRingeR". This is a battery eliminator that also supplies switchboards with 20 cycle ringing power.

Another feature which is perhaps of paramount importance to all telephone companies, is the reward offered to the finders. The company which is now operating the *oldest* "RectiChargeR", will receive a new late model "RectiChargeR" to replace the old one, while the maintenance man making the discovery will receive a one hundred dollar United States Defense Bond.

Participants can easily determine the age of a Raytheon "RectiChargeR" by checking the serial number on the name plate. The smaller the number, the older the "RectiChargeR".

Those who wish to join Raytheon in its search for the oldest "RectiChargeR" should write for further details to: Raytheon Manufacturing Company, Dept. 6470 NR, Waltham 54, Mass.



Because of the rapid growth of Indiana Associated Telephone Corporation, the company's Northern District has been made into two. The new district has been designated as the Northwestern with headquarters at Valparaiso. The exchanges included in the new district are Hobart, Valparaiso, La Porte and the other smaller surrounding exchanges.

Preston E. Platt (above), former commercial manager of the company's Elkhart, Ind. exchange, was appointed district manager and assumed his new duties effective March 1, 1952. Mr. Platt began his telephone career in the Plant Department at the Logansport exchange and has worked in the Traffic and Engineering Departments.

• • •

JOSLYN MFG.: McCoy Heads Joslyn Sales

E. R. McCOY, for 18 years with the sales department of Joslyn Mfg. & Supply Co., Chicago, Ill., was recently appointed sales manager. He joined Joslyn in 1934 at the Omaha office and moved to Chicago as assistant sales manager in 1946.

Mr. McCoy moves into the position vacated by M. M. Kenneally, who will act as sales consultant to the company on a part time basis. Mr. Kenneally expects to spend the balance of his time at his new home in Mt. Dora, Fla., thus winding up 36 active years in the industry. He began his career with Iowa Public Service Co., and prior to joining Joslyn in 1944, served with Ohio Brass Co. and Porcelain Insulator Co.

This year Joslyn celebrates its 50th

(*Please turn to page* 88)

Construction
With the Double
and America's

cook no. 3800
central office protector
Combines cable termination with protectio
of central office personnel and equipme
against high potentials and sneak current
In operation, it opens the switchboard circui
grounds the outside line, and operates a
alarm circuit. Note these construction and o
erating features:
1. Provides for temporary disconnect.
2. Self-soldering, low-resistance heat coils
easily reset after operation without
changing, reversing or re-soldering
coils.
3. Line and switchboard connections on
opposite sides of protectors.
4. Steel mounting plate for maximum
strength.
5. Unit dischargers, consisting of two
carbons, separated by acetate dielectric cemented together, permanently
grounds the outside line under continuous discharge.
6. Easily tested without removing heat
coil; withdrawal of test plug leaves
protector in operating condition.
STROMBERG Telephone CARLSON
TELEPHONES, SWITCHBOARDS • SOUN

Materials and Supplies . . .

Guarantee of Stromberg-Carlson Leading Manufacturers . . .

battery eliminator and ringing supply all in one!

raytheon's new RectiRingeR

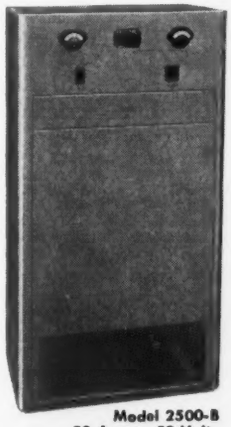
The new RectiRingeR consists of a time-tested Raytheon RectiFilteR to supply humless, regulated DC power for the switchboard, and an adaptation of an exclusive saturable core reactor to supply 20 cycle ringing power. Field-tested for more than twenty years, these two units are now combined to provide trouble-free power for switchboard and 20 cycle ringing.

The Raytheon RectiRingeR is also equipped with a relay which automatically connects the switchboard to a source of standby power, if the AC power source should fail. Complete specifications on request.

here's how the 3-phase

flotrol automatic battery charger

reduces operating costs!



Model 2500-B
50 Amps., 50 Volts

GREATER POWER SAVINGS—The unusually high efficiency of this 3-phase self-contained unit (50% at 10% of rated load and 75% at 40% rated load), results in continuous power savings to the FLOTROL user, sufficient to pay for the unit in less than its anticipated life.

REDUCED MAINTENANCE COSTS—The FLOTROL contains no moving parts; once installed, requires no further attention.

MAXIMUM BATTERY LIFE—By floating the battery at constant voltage, battery activity is reduced to a minimum.

DC voltage delivered is regulated within 1%. Complete overload protection is as automatic as charging itself.

WRITE for Bulletin 161—completely describing the FLOTROL system for 3-phase operation.

long life telephone dry cells

"Eveready" "Columbia" "Gray Label"

• Higher sustained voltage • Longer life • Rock-bottom economy.

These qualities, more important now than ever before, are assured through the constant supervision of America's largest dry battery laboratory.

Made by the makers of "Eveready," "Air Cell" Operators' Transmitter Batteries.

The quality cell preferred by telephone engineers

Distributed by STROMBERG-CARLSON

ROCHESTER 3, NEW YORK

EQUIPMENT AND ELECTRONIC CARILLONS • INDUSTRIAL, INTERCOMMUNICATION SYSTEMS • TELEVISION, RADIOS AND RADIO-PHONOGRAPHS

P&H PENTA POLES

FULL LENGTH TREATED NORTHERN WHITE CEDAR

The preservative (a highly chlorinated phenol solution) is more toxic than any others in common use. Penetration and diffusion of the preservative increase with time.

PAGE AND HILL, INC.

MINNEAPOLIS, MINN. • 50 CHURCH ST., NEW YORK, N. Y.

DISTRIBUTED BY AUTOMATIC ELECTRIC SALES CORPORATION • • • STROMBERG-CARLSON COMPANY

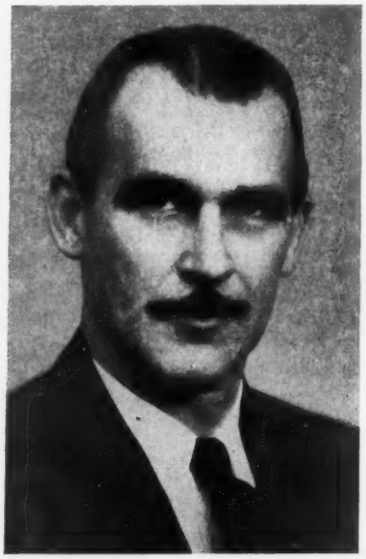
E. R. McCoy

anniversary as manufacturers of complete line equipment for the transmission and distribution of electrical power. The firm was organized in Chicago by M. L. Joslyn in 1902.

HIGHWAY TRAILER CO.: R. E. Templeton

RECENT APPOINTMENT of R. E. "Bob" Templeton as Central Regional Manager of the Highway Trailer Co., Edgerton, Wisconsin, has been announced by L. E. Craig, vice president and general sales manager.

Mr. Templeton joined the Highway Trailer Co. after 14 years in the trailer and transportation field. He was associated with American Bantam Car Co. as east coast regional manager and with the Fruehauf Trailer Co. He joined the Highway organization after several years with



R. E. "Bob" Templeton

ONAN
Emergency
Electric Plants
for
Civil Defense

No matter what happens to central station power during a bombing attack, electricity for essential defense needs is always available with Onan Electric Plants. Onan units, mounted on truck or trailer, or carried in the trunk of a car, can be rushed to any point where power and light are needed. Sturdy and dependable, Onan Electric Plants are an important link in a city's defense against disasters of any kind.

Write for folder

Power & Light for Every Need

Portable, Mobile, or Stationary
400 to 35,000 watts. A.C. or D.C. models.

Onan PRODUCTS

D. W. ONAN & SONS INC.

7560 UNIVERSITY AVE., MINNEAPOLIS, MINN

Gramm Trailer Corp. as national account man.

Mr. Templeton is a graduate of Ohio Northern university and has had extensive training in banking and finance through the American Institute of Banking.

As central regional executive Mr. Templeton will serve the area including Ohio, Michigan, Indiana, Western Pennsylvania, West Virginia and Kentucky. His headquarters office will be in Cincinnati at 2150 Colerain Avenue.

COFFING HOIST CO: New Coffing Spur-Gear

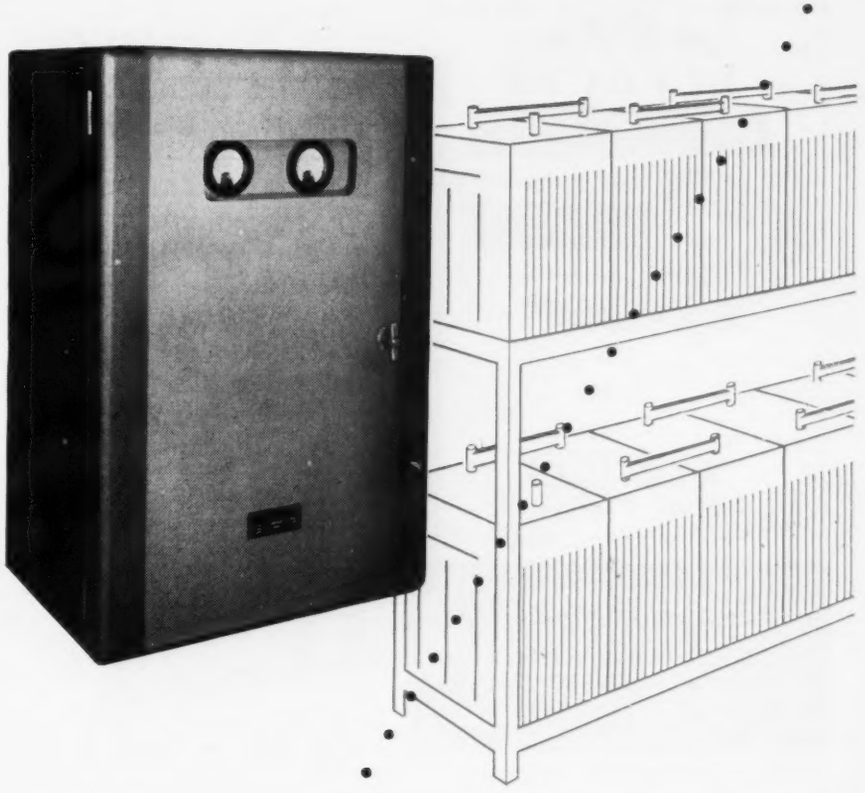
THE CHALLENGER, a spur-gear hoist incorporating new design innovations, is now in production in ½- and 1-ton capacities, according to the manufacturer, Coffing Hoist Co., Danville, Ill. The entire unit, including standard length of high-strength coil chain for an 8-ft. lift, weighs only 39½ lbs., thus is easily moved from one place to another, as needed.

Strength and unusual resistance to shock-load breakage are said to be gained by the use of formed steel plate in the housing in place of the more common cast aluminum alloy. The back plate is laminated to give

(*Please turn to page* 94)

W. L. Bender (above) has been appointed merchandising manager for Ray-O-Vac Co., Madison, Wis. The appointment was made by J. A. McInnay, Ray-O-Vac general sales manager, at the close of the recent sales conference in Madison. Mr. Bender was transferred from field selling to the general sales staff a year and a half ago. Since then he has assisted Mr. McInnay with administrative duties and as a member of the Merchandising Committee.

for LONGER battery LIFE



keep the floating voltage constant with PECO Automatic Battery Chargers

The PECO Battery Chargers accurately float the control battery of any power station or substation which has a reasonably constant switchboard load; furnishes power to the load and maintains a fully charged battery, ready for any emergency.

To provide extreme accuracy of electronic control and the exceptional reliability demanded by this type of service, Power Equipment engineers designed this PEC-626 Automatic Battery Charger by starting with the rugged components of a manual charger, then added a magnetic system for coarse voltage control and a simplified electronic system for fine voltage control.

As an illustration of the accuracy of the PECO charger, this example can be used: the DC output is sufficient to maintain 60 lead acid battery cells at 129 volts; it will also furnish power to switchboard loads within the rating of the charger, and at all times the output voltage is automatically regulated to within ± 0.5 percent, for AC line voltage fluctuations of ± 5 volts on a 230 volt circuit.

Exceptional reliability is shown by the fact that if the electronic control section should be disconnected, the magnetic control section will still automatically hold the output voltage to within ± 3 percent of nominal voltage.

Write for complete specifications today.

POWER EQUIPMENT

Battery Chargers ☆ Battery Eliminators ☆ D.C. Power Supply Units ☆ Regulated Exciters ☆ and other Special Communications Equipment

55 ANTOINETTE STREET DETROIT 2, MICHIGAN

Company

THE CLEARING HOUSE

For the Convenience of readers of Telephone Engineer

BUCKEYE

Reconditioned

Federal Model "802"

The 802 has "Packaged Part" components that assure on the spot replacement. (Equipped with Type A.E. #24 dials when specified.)

Equipped with capsule type receiver and transmitter, the 802 is available for either automatic or manual service. Complete with new cords.

BUCKEYE TELEPHONE & SUPPLY CO.

1250 Kinnear Road — Columbus 8, Ohio

Cedar Poles

THE MAC GILLIS & GIBBS CO.

1615 E. Royall Place, Milwaukee 2, Wis.

Northern White and Western Red Cedar
Creosote and Pentachlorophenol Treatments

PINS AND BRACKETS

Manufacturers of all sizes Locust Pins, Oak Brackets, Locust Bushings.

REA Approved.

L. H. WIEBEL, INC.

Charlottesville — Virginia

USE BARTLETT SAWS

No. 114B—Special Utility Saw combines for the first time: Quick cutting, Smooth cutting, Easy operation.

BARTLETT MFG. CO.

Box 58, 3003 E. GRAND BLVD., DETROIT, MICH.

RATES ARE REASONABLE . . . 15 cents a word. In figuring cost of ads, count each word of address in number of words used. All ads payable in advance. Minimum charge 15 cents a word, except for Situation Wanted Ads, which are only $2.00. Special rates for display type ads on request. TELEPHONE ENGINEER AND MANAGEMENT is published on the 15th of each month. Ads should reach us by the first of the month.

CLASSIFIED ADVERTISEMENTS

Help Wanted

COMBINATION MEN WANTED

Good salaries, permanent positions, advancements, opportunities to specialize and learn all phases of telephone business.

PECOS & NORTHWESTERN TELEPHONE COMPANY

Pecos, Texas

MANAGER WANTED for central Illinois Company operating four exchanges with 1,100 stations. Dial, common battery and magneto service. Must be able to handle all phases of telephone work and be capable of working with and directing present efficient personnel. Good salary and other benefits. Please give complete reply. Box 8779, Telephone Engineer Publishing Corp.

COMBINATIONMAN, permanent position, good wages, numerous employee benefits. Employment also affords opportunity for advancement. Replies are strictly confidential and should include details of experience and objectives. Write Union Telephone Company, Owosso, Michigan.

WANTED—Salesman to cover Missouri and Kansas for telephone supply house on commission basis. Car furnished. Box 8783, Telephone Engineer Publishing Corp., 7720 Sheridan Road, Chicago, Ill.

MANAGER for rapidly expanding, extensive, group of Western telephone properties. Must have administrative ability simultaneously to obtain efficient operations and achieve required, sound expansion program. Must have capacity to hire, train and direct personnel in all phases of telephone work. Permanent position carrying substantial opportunity for qualified person. Technical, plant and commercial knowledge and experience absolute requirement. Salary commensurate with qualifications. Replies confidential. Furnish complete details of education, experience and objectives in first reply. Write Box No. 8772, c/o Telephone Engineer Publishing Corp.

HELP WANTED—MANUAL Central Office Equipment Installers and Dial or Manual Central Office Repairmen wanted. Supervisory and non-supervisory positions open. Attractive salary, working conditions, pension plan and other benefits. Excellent opportunity for advancement. State age, experience and send small photograph. General Telephone Company of Illinois, Illinois Building, Springfield.

Business Opportunity

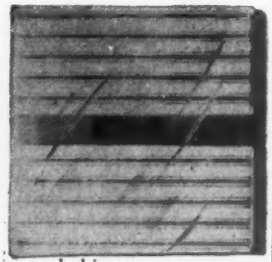
BUSINESS OPPORTUNITY for aggressive individual willing to make investment and assume complete charge of setting up sales force for young and growing telephone supply company. Furnish education, experience and personal information in reply to box 8782, Telephone Engineer Publishing Corp.

packed in cartons

Cable-Splicers

WIPING CLOTHS

Formed-flexible finishing cloths (Patented); Flat finishing cloths; Catch cloths; Crotch cloths and Up-right joint catch cloths. Made of world-prize HERRINGBONE TICKING or imported English MOLESKIN. Write for literature and prices from your jobber or from us.



sealed in wax paper wrappers

GEO. E. WILLIAMS, *Mfr.*

3035 ALDRICH AVE., MINNEAPOLIS 8, MINN.

For Sale

TRANSPOSITION BRACKETS

SINGLE POINT, Hubbard #9252, 2" wide ⅜" thick 10" long less carriage bolt and steel pin.
45 to barrel .....New ea. .45

PHANTOM, Hubbard, 4 wire, one piece, 1½" wide, ⅝" thick, 23" long, similar to #9264, clamp to arm. 10 to box .....New ea. 1.90

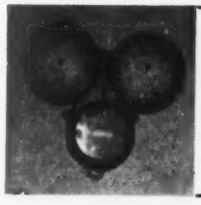
GRADE CLAMPS, Western Electric Type B, for cable up to 1 3/16" diameter. 100 to box ....New ea. .50

The above brackets fit 3¼ x 4¼ arms. Heavily constructed for long spans, corners and icing. Large stock for immediate shipment.

JOHN W. ORR
Belle Mead, New Jersey

FOR SALE—New dial switchboard, one new Kellogg Relaymatic 200 lines, with 120 lines wired, 12 links, coded ringing, G.E. tungar charger, three trunks, two composite and one loop. Batteries and composite equipment not included. Reason for selling, board is too small for the area served. AVAILABLE FOR IMMEDIATE DELIVERY. Gardonville Co-op Telephone Association, Brandon, Minnesota.

Like New—Replacement Parts, Kellogg Mfg. Ringers, Harmonic type, 33-1/3—50—66-2/3 Cycle. 30—42—54—66 Cycle, @ $1.00 each
Coils for above, 500 Ohm each. @ .50c each.
Induction Coils. Common battery, #79—#99, @ 50c each. #103 type. Anti-Side Tone, with connector strip, @ $1.00 each
Receivers, Kellogg, #41 type Complete, W/cords @ $1.25 each
Common Batt. Steel ringer boxes, #610—#602—#600 @ $3.50 each
INDEPENDENT TELEPHONE REPAIR CO.
2137 W. 21st St., Chicago 8, Ill.



Rebuilt, Refinished.
Loud ringing bells. 1000 or 2500 Ohm @ $8.00 each. With Condensers @ $9.00 Each.
F.O.B. Chicago, Ill.
INDEPENDENT TELEPHONE REPAIR CO.
2137 W. 21st St.
Chicago 8, Illinois

CROSS ARMS

Wood, creosoted, 8 pin 3¼ x 4¼ x 7'4" $1.35 each. F.O.B. Palmyra, New Jersey. Also Anchor Rods, Belts, and many other items.

COOK INDUSTRIES, INC.
12 N. Seventh St. Camden 2, N. J.

FOR SALE—Magneto exchange. 205 stations company owned, and 250 switchers. Central Missouri, close to the lake of the Ozarks. Details on request. Write Stover Telephone Exchange, Stover, Missouri.

USE TELEPHONE ENGINEER AND MANAGEMENT'S CLEARING HOUSE
To locate workers—jobs—merchandise. A small ads covers the field.

INVENTORY CLOSEOUT SPECIALS

Quantity	Description	Price
	HARDWARE	
221	#29958 ⅝" x 8" Oval Eye Bolts	.40 ea.
101	#29960 ⅝" x 10" Oval Eye Bolts	.42 ea.
400	# 6448 2 Bolt Medium Guy Clamps	.27 ea.
200	# 6449 3 Bolt Medium Guy Clamps	.38 ea.
300	# 7020 20" Crossarm Braces	.20 ea.
640	# 7028 28" Crossarm Braces	.28 ea.
	STRAND — ANCHORS — RODS	
84	#88135 8"-8 Way Chance Expanding Anchors	2.55 ea.
200	# 64 6"-4 Way Chance Expanding Anchors	1.90 ea.
11,750 ft.	5/16" Siemens-Martin 7 Strand Guy Wire	37.18M. ft.
6,500 ft.	¼" Siemens-Martin 7 Strand Guy Wire (250 ft. coils)	26.50M. ft.
	WOOD PRODUCTS — INSULATORS	
3000	1¼" x 8" Locust Pins	.06 ea.
5000	1½" x 2" x 10" Oak Brackets	.04½ ea.
6000	1⅝" x 2" x 12" Oak Brackets L.D.	.05½ ea.
6000	2" x 2⅜" x 12" Oak Brackets W.U.	.06½ ea.
4000	# 9 Single Groove Glass Insulator	.06 ea.
4000	#12 Double Groove Glass Insulator	.07 ea.
	MISCELLANEOUS	
644	#6715-1 Kearney Snub-r-Grips (for drop wire)	.16 ea.
1995	#5694-7 Kearney Bridge or test connectors	.16 ea.
164	#1000H Reliable Outdoor Protectors	1.94 ea.

TELEPHONE REPAIR AND SUPPLY CO.

Daniel H. McNulty, President
1760 Lunt Ave. Chicago 26, Illinois

FOR SALE

North Electric Company CX 10000 All Relay Branch Office Switchboard Equipment as follows:

Lines—1000—capacity	880 wired	880 equipped
PBX rotary lines (included in above)	36 wired	36 equipped
Local trunks—one-way outgoing	60 wired	60 equipped
Local trunks—one-way incoming	70 wired	70 equipped
Toll trunks—one-way incoming	10 wired	10 equipped
Intercept trunks	100 wired	100 equipped
Line finder—connectors	120 wired	120 equipped
First selectors	120 wired	120 equipped
Second selectors (local)	75 wired	75 equipped
Local incoming trunk 2nd selector	70 wired	70 equipped
Local test selector	4 wired	2 equipped
Trunk (or link) finder	60 wired	60 equipped
Incoming toll 2nd selector	10 wired	10 equipped

2—Leich vibrating converters, 5 frequency, code harmonic ringing

More than one-half of this equipment was installed new in 1940, with subsequent additions being made in 1946, 1948 and 1950, and all of the equipment was removed from service early in 1951 after it had been subject to an explosion, fire and water damage, which occurred on December 25, 1950.
We are soliciting bids from operating telephone companies and used equipment dealers for the purchase of this equipment.
This equipment is available for inspection at 421 Locust Street, Johnstown, Pennsylvania.
Address all inquiries to:

PENNSYLVANIA TELEPHONE CORPORATION
20 East Tenth Street Erie, Pennsylvania

FOR SALE—New 20" galvanized cross arm braces. $22.00 per hundred. Ask for quantity prices and freight allowances. Fortune's Equipment, 1231 Broadway, Fresno, California.

FOR SALE—150 Kellogg switchboard. Different kinds of telephones. At a bargain. Reason for selling, cut to dial. Colmesneil Telephone Company, Colmesneil, Texas.

WANTED—Western Electric Magneto switchboards with the shutter door #22 C combined type drops & jacks. No shipping problems. Ship jacks and keys only.
Call or write
BOHNSACK EQUIPMENT CO.
Germantown, N. Y. Tel. 100-W

WANTED TO BUY—Small telephone exchange. East or Midwest. W. Martin, 63 Florence Avenue, Hawthorne, New Jersey.

Buyers' Directory

The New Products' Showcase

ACETYLENE EQUIPMENT—"Prest-O-Lite" No. 1 Lineman's outfit helps you do a better job, quicker and easier. The Linde Air Products Co., 30 E. 42nd St., New York 17, N. Y. —[ADV. 1]

ADVERTISING, Directories—General Telephone Directory Co., 604 Pine Ave., Long Beach, Calif., and 185 N. Wabash, Chicago, Ill.—[ADV. 2]

ANCHORS, Plastic Expanding, Universal. All Purpose—Mount in any Material, Holub Industries, Inc., 424 DeKalb Ave., Sycamore, Ill.—[ADV. 3]

ANCHORS & WIRE CONNECTORS—Matthews Scrulix Anchors, Matthews Telephone Wire Connectors. Write for bulletins. W. N. Matthews Corp., St. Louis 16, Mo.—[ADV. 4]

AUGER—The "Alaska Frost Auger." Free trial on your own machines. Henning Electric Motor Co., P. O. Box 786, Fargo, N. D.—[ADV. 5]

BATTERIES, Dry Cell—The Ray-O-Vac Company, 2317 Winnebago St., Madison, Wisc.—[ADV. 6]

BATTERY—WATER UNITS Demineralizers for Tap Water—A. E. Tomkin & Co., 1828 Columbia Rd., N.W., Washington 9, D. C.—[ADV. 7]

IF YOU DO not see a listing in these columns of products or services you are interested in write "Buyers' Directory", 7720 Sheridan Road, Chicago 26, Illinois, for such information. It will be furnished quickly and without charge.

BELTS — CLIMBERS — COMPLETE LINEMEN'S EQUIPMENT, W. M. Bashlin Co., Bashlin Bldg., Grove City 1, Pa.—[ADV. 8]

BELTS — CLIMBERS — PLIERS — SAFETY STRAPS—CONSTRUCTION TOOLS. Klein & Sons, Mathias. 3200 Belmont Ave., Chicago 18, Ill.—[ADV. 9]

BOOTHS—Acoustic Telephone—Sherron Metallic Corp., 1202 Flushing Ave., Brooklyn 6, N. Y.—[ADV. 10]

BOOTHS—Churchill Cabinet Co., 2119 Churchill St., Chicago 47, Ill.—[ADV. 11]

CABLE, All Plastic, Aerial, Duct, Direct Burial, PBX, Switchboard.—The Ansonia Electrical Co., Ansonia, Conn.—[ADV. 12]

CABLE SPINNING—The Cable Spinning Equipment Company, 432 Crane St., Topeka, Kans.—[ADV. 13]

CARRIER EQUIPMENT—Adler Telephone & Telegraph Carrier Equipment has been standard for twenty years in the Independent Field. Mfd. only by Southern Electric & Transmission Co., 3127 Holmes St., Dallas, Texas.—[ADV. 14]

CONNECTORS, CABLE—Cannon Electric Development Co., 3209 Humboldt St., Los Angeles 31, Calif.—[ADV. 15]

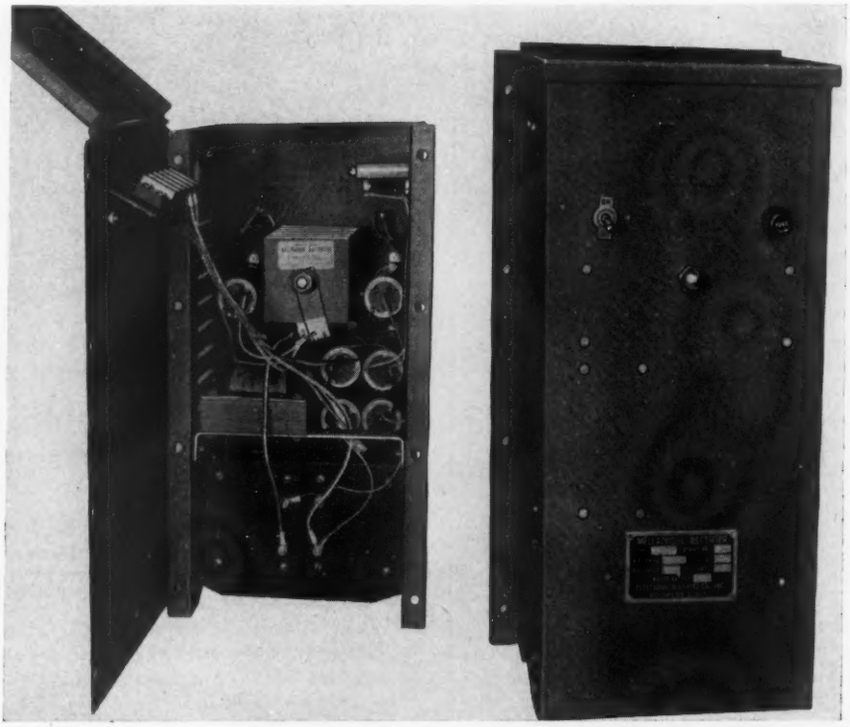
CORDS, Instrument and Operators—Commercial Cord & Supply Co., 26 Main St., Clifton Springs, N. Y.—[ADV. 16]

CORDS, Switchboard & Telephone—Runzel Cord & Wire Co., 4727-31 Montrose Ave., Chicago 41, Ill.—[ADV. 17]

CROSS ARMS—American Cross-Arm, Inc., 141 W. Jackson Boulevard, Chicago, Ill.—[ADV. 18]

"EARTH BORING MACHINES" Sterling Model "A"—Precision Engineered and Hydraulic Controlled. Sterling Engineering & Mfg. Co., 173 Gilligan St., Wilkes-Barre, Pa. —[ADV. 20]

ELECTRIC HOT WATER HEATERS. Thermostatically controlled for any hot water heater, Vulcan Electric Co., Danvers 17, Mass.—[ADV. 21]



SELENIUM RECTIFIERS FOR TELEPHONE USE

The Electronic Rectifier Co., Rochester, N. Y., is now manufacturing two rectifiers which fit the needs of telephone operating companies. According to the manufacturer these rectifiers eliminate the expense and nuisance of batteries, deliver continuously correct voltage, and possess no moving parts to wear out. A. C. voltage taps provide for bell ringing and operating door openers and the like, when necessary. For systems which require D. C. for ringing the rectifiers provide ample capacity. Quiet, hum-free operating is assured by multi-stage filter network. These two, new selenium rectifiers are:

SF-3-DP, 12 D. C. output volts, 3 D. C. amps, 6-12 and 18 A. C. voltage for ringing, 60 cycle A. C. input of 115 volts—though 220 volts are available.

SF-15-FP, 24 D. C. output volts, 1.5 D. C. amps, 6-12 and 24 A. C. volts for ringing, and 115 60 cycle A. C input volts—though 220 volts are available.

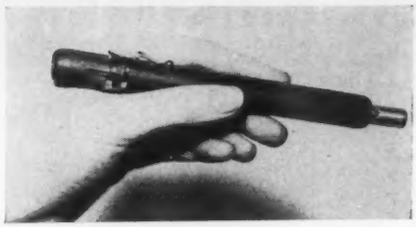
The other selenium rectifier offered by the Electronic Rectifier Co. is the RP-3 Science Panel—O—28 volts, A. C. or D. C. at 10 amps. This selenium rectifier stands in a 16-gauge steel cabinet, 17½ inches high; 12 inches wide and 7½ inches deep, has ammeter, voltmeter, A. C. to D. C. switch. For complete information check New Products 418.

MECHANIC'S CASE

Allied Brief Case Co., offers a specially designed "Mechanics Case" for use by repairmen, radio mechanics, electricians, installers, and telephone men. The big feature of these cases is the large amount of space available in the top section for the mechanic to carry his complete set of tools . . . plus the special metal trays that slip out of the bottom and have various compartments for carrying all necessary parts.

Made of heavy gauge top grain Cowhide there are two styles of Allied Mechanic's Cases available.

For further information check New Product 419.



MAGNETIC PROBE

New G-S Magnetic Probe, made of super-magnetic alloy, is no larger than a fountain pen. Point of magnet is extended or retracted from a case by turning end-knob. Strength of magnet can be controlled by amount of extension.

The G-S Probe is particularly useful for removing steel or iron particles from areas where such foreign matter is harmful, such as the operating area of electrical instruments or delicate mechanisms. It will also conveniently remove sharp particles of steel, iron or nickel from storage bins and retrieve magnetic particles from holes and similar hard-to-reach places.

Assemblers and inspectors find the Probe useful to test coat of surfaces for magnetic properties.

Plant first aid stations use the Probe to remove steel splinters from the eyes or skin of employees. Nurse or doctor can adjust strength of magnet for proper extraction to reduce pain or rupture of tissues. The Probe can be sterilized without harming magnet. For further information check New Product 420.

FILLER TAPE

A new oil-resistant tape for rapid insulation build-up on splices in large power cables has been announced by Minnesota Mining & Manufacturing Co., St. Paul, Minn.

Designated "Scotch" brand electrical tape No. 25, it is made of synthetic rubber providing greater dielectric strength and resistance to high temperatures than natural rubber tapes.

The chemical-resistant qualities of the tape make it especially suitable for use in oil drilling, mining and underground cable operations, while the 40-mil thickness and extreme stretch (1500% breaking point) make possible smooth insulation wraps on irregular surfaces.

Dielectric strength is 15,000 volts unstretched, and 10,000 volts at 500% elongation. It has an electrolytic corrosion factor of 1.0 and an insulation resistance of 100,000 megohms. The tape is available in ¾-inch by 15-foot rolls, is green-colored, and has a white strippable liner to be removed before use.—Check New Product 421.

Buyers' Directory

ENGINEERING, Construction—Neale Construction Company, 432 Crane St., Topeka, Kans.—**[ADV. 22]**

FURNACES—For quickly and economically melting lead and paraffin—Mutual Liquid Gas Equipment Co., Inc., 3600 W. Imperial Highway, Los Angeles, Calif.—**[ADV. 23]**

INSPECTION SERVICE—For poles, crossarms, and preservative treatments. Inspectors stationed throughout U.S.A. A. W. Williams Inspection Co., Mobile, Ala.—**[ADV. 24]**

INSULATORS, Porcelain—Porcelain Products Inc., Box 300, Findlay, Ohio.—**[ADV. 25]**

LIGHTWEIGHT PULLERS—Coffing Hoist Company, 800 Walters St., Danville 5, Ill.—**[ADV. 26]**

PIPE PUSHERS—Giant Manufacturing Co., South 6th St., at 12th Ave., Council Bluffs, Iowa.—**[ADV. 27]**

PIPE PUSHERS—Greenlee Tool Co., 2136 12 St., Rockford, Ill.—**[ADV. 28]**

POLE HOLE DIGGERS—For derrick mounted trucks. Tele-E-Lect Products, Inc., 9613 Minnetonka Blvd., Minneapolis 16, Minn.—**[ADV. 29]**

POLES—Cedar poles and Fir cross arms. R. G. Haley & Co., Inc., Spitzer Bldg., Toledo 4, Ohio.—**[ADV. 30]**

POLES, Southern Yellow Pine—Colfax Lumber & Creosoting Co., Inc., P.O. Box 23, Pineville, La.—**[ADV. 31]**

POLES, Creosoted Southern Yellow Pine and Douglas Fir. The Long-Bell Lumber Company, Wood Preserving Div., R. A. Long Bldg., Kansas City, Mo.—**[ADV. 32]**

POLES, Southern Yellow Pine—Taylor Colquitt Company, 290 E. Main St., Spartanburgh, S. C.—**[ADV. 33]**

POLES, Southern Yellow Pine—Texas Creosoting Co., Orange, Texas.—**[ADV. 34]**

POLES—Texas Best pressure-creosoted poles, Lone Star Creosoting Co., P. O. Box 9, Longview, Texas.—**[ADV. 35]**

POLES—Western Red Cedar, Western Larch, Lodgepole Pine. B. J. Carney & Co., Minneapolis 3, Minn. and Spokane 8, Wash.—**[ADV. 36]**

POLES & CROSSARMS—Creosoted poles and crossarms. Conroe Creosoting Co., Conroe, Texas.—**[ADV. 37]**

PROTECTIVE EQUIPMENT—Reliable Electric Company, 3145 Carroll Avenue, Chicago 12, Ill.—**[ADV. 38]**

PRINTING—Telephone forms, Cullom & Ghertner Co., 600 21st Ave., Nashville 4, Tenn.—**[ADV. 39]**

REBUILT TELEPHONE & SWITCHBOARDS—Telephone Repair & Supply Company, 1760 Lunt Avenue, Chicago 2, Ill.—**[ADV. 40]**

SUPPLIES—New all metal heavy duty extension loud ringers; ready wire reels, payout only and payout and takeup in one.—Suttle Equipment Co., Lawrenceville, Ill.—**[ADV. 41]**

SWITCHBOARDS, TELEPHONES, ETC.—Automatic Electric Co., 1033 W. Van Buren St., Chicago, Ill.—**[ADV. 42]**

TELERING—Telephone ringing by frequency conversion. Voltage range for all purposes, central office and private branch exchanges. Telkor, Box 186, Elyria, Ohio.—**[ADV. 43]**

TRUCK BODIES—Highway Trailer Co., Edgerton, Wisc.—**[ADV. 44]**

TRUCK BODIES AND EQUIPMENT—McCabe Powers Auto Body Co., 5900 N. Broadway, St. Louis 15, Mo.—**[ADV. 45]**

WIRE DROP & INSIDE—Jackets of neoprene, rubber or plastic. Lowell Insulated Wire Co., Lowell, Mass.—**[ADV. 46]**

WIRE, Insulated—DATED DROP WIRE—Neoprene or Weatherproof—Alphaduct Wire & Cable Co., Milltown, N. J.—**[ADV. 47]**

WIRE, Insulated Drop and Bronze or Copperweld—Acorn Insulated Wire Co., Inc., 36 Freeman St., Pawtucket, R. I.—**[ADV. 48]**

WIRE, Insulated Drop, Genuine Ironite—Paragon Electric Co., Two Rivers, Wis.—**[ADV. 49]**

WIRE, Insulated Drop, HT Bronze, Paraprene or Braid Insulation—Paragon Electric Co., Two Rivers, Wisc.—**[ADV. 50]**

WANT INFORMATION??
IF YOU DO not see a listing in these columns of products or services you are interested in write "Buyers' Directory", 7720 Sheridan Road, Chicago 26, Illinois, for such information. It will be furnished quickly and without charge.

SEND IN THIS COUPON FOR MORE INFORMATION

Telephone Engineer Publishing Corp.
7720 N. Sheridan Road
Chicago 26, Illinois

Please forward complete information on the following products and services described in the May, 1952 issue of TELEPHONE ENGINEER AND MANAGEMENT. (Check information desired.)

NEW PRODUCTS

NP 418..... NP 419..... NP 420..... NP 421.....

SERVICES AND SUPPLIES

ADV. 1.....	ADV. 2.....	ADV. 3.....	ADV. 4.....	ADV. 5.....	ADV. 6.....
ADV. 7.....	ADV. 8.....	ADV. 9.....	ADV. 10.....	ADV. 11.....	ADV. 12.....
ADV. 13.....	ADV. 14.....	ADV. 15.....	ADV. 16.....	ADV. 17.....	ADV. 18.....
ADV. 19.....	ADV. 20.....	ADV. 21.....	ADV. 22.....	ADV. 23.....	ADV. 24.....
ADV. 25.....	ADV. 26.....	ADV. 27.....	ADV. 28.....	ADV. 29.....	ADV. 30.....
ADV. 31.....	ADV. 32.....	ADV. 33.....	ADV. 34.....	ADV. 35.....	ADV. 36.....
ADV. 37.....	ADV. 38.....	ADV. 39.....	ADV. 40.....	ADV. 41.....	ADV. 42.....
ADV. 43.....	ADV. 44.....	ADV. 45.....	ADV. 46.....	ADV. 47.....	ADV. 48.....
		ADV. 49.....	ADV. 50.....		

Name ..... Title.....

Company .....

Street Address .....

Town..... Zone..... State.....

(Continued from page 89)

extra rigidity for supporting the hoist mechanism. This plate and all other load holding parts are of high-strength steel that will hold five times the rated capacity of the hoist, according to the manufacturer. To further check and confirm its strength, every Challenger is tested at 100 percent overload as it comes off the production line.

A Coffing spokesman advises that in designing the Challenger, special attention was given to ease of servicing. A survey conducted by the manufacturer among users of all makes of hoists had revealed that the most universally expressed unfilled need was for easier servicing. The Challenger is therefore built so that it may be disassembled in a matter of minutes with simple tools. This, according to the manufacturer, represents an important forward step in hoist design from the point of view of convenience to the owner. Another design feature claimed for the Challenger is that it hangs true whether or not it is supporting a load.

The Challenger also is said to be sealed and running in lubricant to contribute to long life and high efficiency. Further information on the new unit is available from the Coffing Hoist Co., 800 Walter St., Danville, Ill.

ELECTRIC PRODUCTS CO.: Dr. William A. Thomas

THE ELECTRIC Products Co., Cleveland, Ohio, a leading manufacturer of special motors and generators since 1909, has announced that Dr. William A. Thomas has joined its engineering staff. Dr. Thomas brings to his new position a wealth of technical experience gained not only from his teaching activities, but also from many years in design engineering and as a consultant for several companies.

Graduating from the Case Institute of Technology (Cleveland, Ohio), he joined the engineering department of General Electric at Schenectady. Leaving there in 1930, he spent the next 10 years teaching and gaining his Master's and Doctor's Degrees in Engineering. During this period, he was an Instructor in Electrical Engineering at Yale and Professor of Electrical Engineering at Antioch College and Iowa State College.

From 1940 to 1948, he was an Electrical Engineer with the E. I. du Pont de Nemours, Inc. at Wilmington, Delaware. In 1948, Dr. Thomas returned to Case as Professor of

Dr. William A. Thomas

Electrical Engineering. From this post, he came to The Electric Products Co.

Active for many years in A.I.E.E. affairs, Dr. Thomas has been Director of the Iowa Section and Vice-Chairman and Treasurer of the Wilmington Sub-Section. At present, he is Chairman of the Basic Sciences Group of the Cleveland Section and is a member of the National Committee on Basic Sciences.

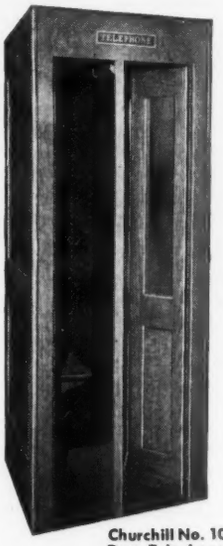
WHAT'S NEW? Dialing Auxiliary

FACILITIES FOR dial signaling can be added inexpensively to existing H-1 Western Electric Carrier Sys-

(Please turn to page 96)

James G. Hagen, newly appointed sales engineer of the Atlanta, Ga. branch of the Stromberg-Carlson Co.

Construction M
With the Double G
and America's Le



The Churchill No. 100 Folding Door Telephone Booth

churchill
ventilated
telephone booth

Attractive—available in two finishes to harmonize with any interior. Included as standard equipment are electric light and automatic electric ventilator.

Users appreciate the comfort and privacy of a Churchill telephone booth—operating companies find it profitable.

Constructed as a single unit and equipped with reinforced back panel for mounting a wall telephone or coin collector.

No. 100-A—Selected white oak, in light medium oak satin finish.

No. 100-B—Birch, mahogany finish.

Overall height is 84¾"; width, 30½"; depth, 30½". Shipped knocked down and crated.

Illustrated literature available.

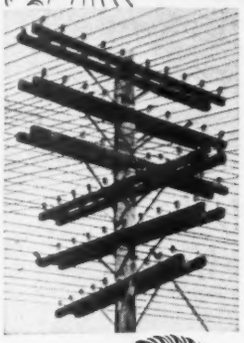
STROMBERG Telephone CARLSON

TELEPHONES, SWITCHBOARDS · SOUN

on Materials and Supplies . . .

ble Guarantee of Stromberg-Carlson
a's Leading Manufacturers . . .

"dependable" *means both the trade-mark & the guarantee of cross-arms by*
American Cross-Arm Inc.



The finest pole and wire installation is useless if cross-arms fail. "Dependable" Cross-Arms are all that the name implies—made of sturdy, American woods, long seasoned, fashioned and finished to stand every weather condition from desert heat to mountain blizzards.

In Douglas Fir—Creosoted Yellow Pine or Gulf-Red Cypress.

better than ever!

because they're made in a new and modern plant

DIAMOND C POLES

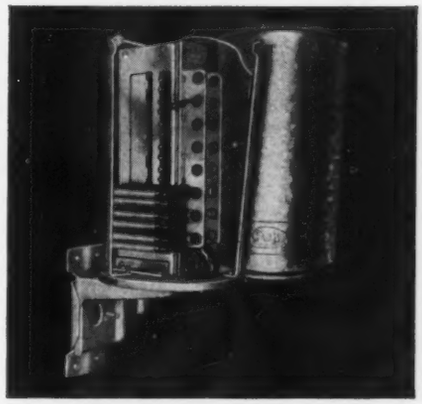
For durability, use DIAMOND C

Something new has been added!—at Pineville, Louisiana—a modern, enlarged creosoting plant offering faster delivery and better-than-ever quality in telephone poles of this well-known, well-liked brand.

Diamond C poles are made of Southern pine, carefully selected from live growing trees and graded according to physical properties desired. Each pole is pressure-treated with 8 lbs. (or more if you wish!) of grade No. 1 Creosote Oil, in accordance with AWPA specifications.

Reduce loss in revenue due to pole failure. Buy Diamond C from S-C!

cook type S-20
pole cable terminal



Can be used as a protected or unprotected terminal. Made in 6, 11, 16, or 26 pair capacity.

Cook Type S-20 Pole Cable Terminals are carefully engineered to offer the user:

MAXIMUM ECONOMY—because Cook Type H 20 Protector Units, containing fuses and primary and secondary lightning arresters, are added only as they are required.

MAXIMUM CONVENIENCE for installation and servicing. Drop wire connections are at front. Drops are led through individual insulating knockout holes. Self-soldering nozzle lies close to pole. Hood locks in raised position for working. Separate mounting bracket eliminates gaining of pole and provides easy installation.

MAXIMUM PERFORMANCE when used separately or as part of the Cook Trans-Mount System of Protection and Distribution. S-20 is of all steel construction, hot galvanized. Complete terminal designed for maximum insulation.

Distributed by STROMBERG-CARLSON

ROCHESTER 3, NEW YORK

SOUND EQUIPMENT AND ELECTRONIC CARILLONS • INDUSTRIAL, INTERCOMMUNICATION SYSTEMS • TELEVISION, RADIOS AND RADIO-PHONOGRAPHS

Insto-Gas

T M REG U S PAT OFF

FURNACE For Cable Splicers

Melts 40 pounds of metal in six minutes

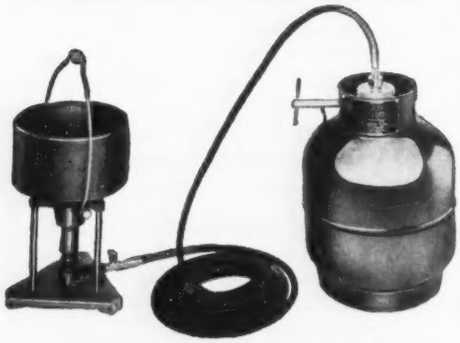
•

Operates in all kinds of weather

•

Lights Instantly — Won't Blow Out

Also available in floor type furnace—With 50 ft. hose can be operated on splicing platform



INSTO-GAS TORCHES

These instant lighting torches are made in five sizes for all kinds of flame soldering and finishing splices.

•

Listed by both Underwriters and Factory Mutuals Laboratories.

Ask your telephone distributor for Insto-Gas or send coupon for descriptive folder

---

Send information on Insto-Gas to

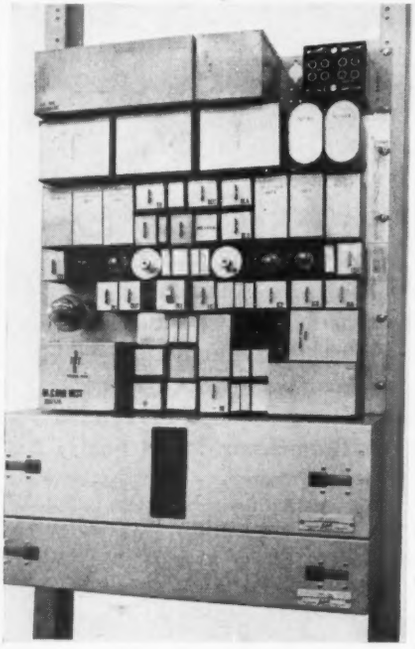
NAME.....

ADDRESS.....

Insto-Gas Corporation • Detroit 7, Mich.

(Continued from page 94)

tems by use of new Type H1-D equipment announced by Lenkurt Electric Co., San Carlos, Calif. One terminal occupies less than nine inches of space on one side of a standard 19-inch rack to provide full-duplex carrier-frequency dial-signaling pulses at the usual rates (10 to 14 pps) on frequencies not essential to the H1 voice channels. Power is ordinarily supplied from existing equipment but individual power supplies are available where required.



New Type H1-D Equipment

Capable of spanning line attenuations usually found on H1 installations, the new Lenkurt auxiliary includes stabilized vacuum-tube oscillators for the generation of signaling frequencies which are transmitted to the line under control of relays actuated by d-c signals from the terminal equipment. Band-pass filters between the H1 terminals and their line filters restrict the voice channels to the range 4400 to 10,750 cps and release frequencies at 4150 and 11,500 cps for the signaling channels. Incoming pulses are reconverted into d-c signals to operate switchboard or dial equipment. Operations in the two directions of transmission are entirely independent.

A. E. TOMKIN & CO.: Free Literature

The A. E. Tomkin & Co., 1828 Columbia Road, N.W., Washington 9, D. C., recently announced publication of a descriptive folder covering the "Hydrion Battery-Water Units".

The release includes a general de-

"ONE, if by land, and TWO, if by sea"

When Paul Revere kindled the flame of freedom, his famous ride took hours. A far cry from the minutes it would take our modern communication systems today.

For more than eighty years now, Hemingray Insulators have been dependably serving the communication and power transmission systems of the world. Neither snow nor sleet, rain nor heat have kept them from faithful performance twenty-four hours a day, year after year

Experience and continuous research have made Hemingray Insulators the finest obtainable. They are available at most jobbers for immediate delivery . . . in any quantity . . . in types for all telephone and telegraph pole lines

HEMINGRAY INSULATORS

AMERICAN STRUCTURAL PRODUCTS COMPANY
Muncie, Indiana

SUBSIDIARY OF OWENS-ILLINOIS GLASS COMPANY

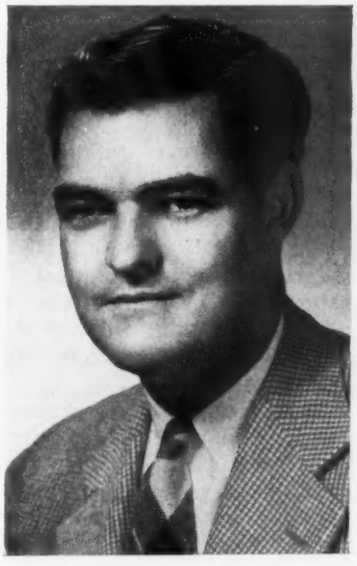
scription of the "Hydrion Battery-Water Units" and explains how the units convert ordinary tap water to pure mineral-free water for battery maintenance purposes. In addition there are included detailed specifications and performance data for both the Standard (Model C51B-S) and the Heavy-Duty (Model C51B-H) "Hydrion Units" with lists of representative users and suggested fields of application. Folder may be obtained direct from A. E. Tomkin & Co.

INTERNATIONAL HARVESTER: Propane-Butane Fueled Trucks

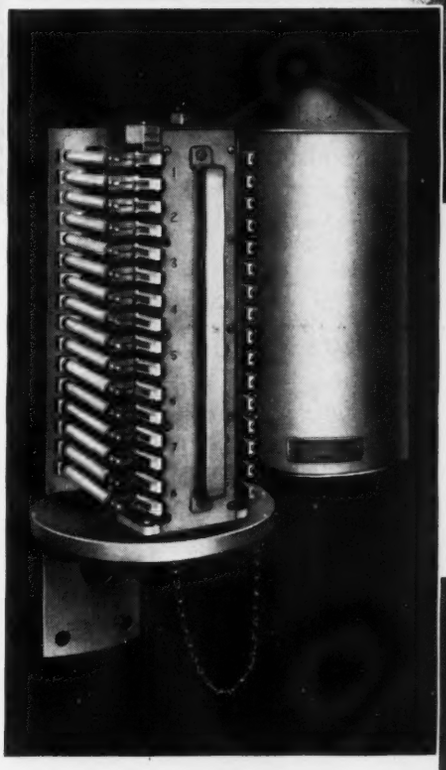
THE MOTOR TRUCK division of International Harvester Co. has introduced, for the first time in motor truck history, factory-built liquefied-petroleum-gas-powered engines as Underwriters Laboratories listed equipment on trucks, W. K. Perkins, manager of motor truck sales, has announced.

International's new LP-gas (propane-butane) engines are optional on all International truck models equipped with the company's heavy-

(*Please turn to page* 98)

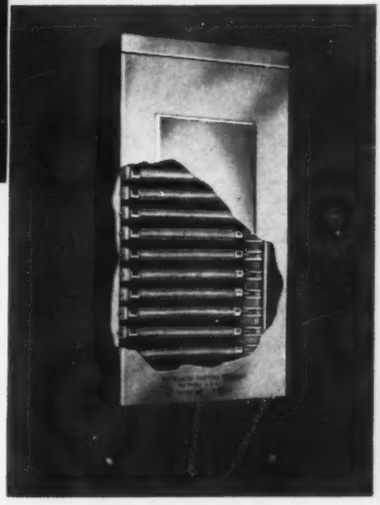


Herbert E. Reynolds, until recently plant engineering superintendent for the Dekalb-Ogle Telephone Co. of Northern Illinois, has become an engineering representative with Lenkurt Electric Co., toll-transmission equipment manufacturer of San Carlos, Calif. Formerly he was a member of the transmission-engineering department of Illinois Bell Telephone Co. During the war Mr. Reynolds served as a pilot and communications officer with the Air Force. Previously, he was an operating engineer with WCBS, Springfield, Illinois.



TYPE 35 PROTECTED CABLE TERMINAL

Sturdy, compact, weatherproof construction insures years of trouble-free service! *Self-clearing* discharge blocks never need resetting—save maintenance time, keep lines in service. Order 11-pair, 16-pair, or 26-pair models with 3-amp fuses—with or without six-foot cable stub.



TYPE 40 PROTECTED CABLE TERMINAL

Just one man can install this simple-to-mount easy-to-connect terminal! Seven pairs equipped with 3-amp fuses, *self-clearing* discharge blocks. Order SA-34 (less stub), SA-35 (with stub).

Products of the Telephone Specialty Department of

AUTOMATIC ELECTRIC

Distributors in U. S. and Possessions: Automatic Electric Sales Corporation
Export Distributors: International Automatic Electric Corporation
1033 West Van Buren Street, Chicago 7, U. S. A.

Ericsson

TELEPHONE EQUIPMENT

is acclaimed the world over for highest quality and performance.

•

Telefonaktiebolaget L. M. Ericsson of Stockholm, Sweden, and associated companies are manufacturers of all kinds of telephone and signal equipment of every size and for every purpose.

•

Represented in the U.S. by

ERICSSON TELEPHONE SALES Corporation

100 Park Avenue, New York 17, N.Y.

duty Super Red Diamond engines. The new LP-gas-powered models include the LP-185, LP-195, and LP-205 Roadliners, and all other models in the L-185 through LF-210 series, Perkins said.

"These significant additions to the International motor truck line will meet the increasing demands of a large group of fleet operators for trucks equipped with factory-installed "propane-butane fuel systems," he said.

"We feel that in making these Underwriter-listed power plants available to truck owners we are making an important contribution to the transportation field. There are a number of benefits in operating efficiency and costs to be derived from using the economical, high-octane fuel."

The potential production of LP-gas is large, Perkins pointed out, with costs in most states running several cents per gallon under that of gasoline. The fuel is available at approximately 4,000 bulk distributing plants in the United States.

Large fuel tanks, standard on International's LP-gas-powered units, permit trucks to run as far as 400 miles between refuelings.

"In equipping highway tractors for LP-gas operation, International took note of the large quantities of high-octane propane-butane available and recognized the potential savings in fuel costs over either diesel or gasoline, especially in locations enjoying low LP-gas cost per gallon," Perkins said.

"Fleet operators will also find that the life of motor oil is considerably lengthened," he continued. "This is because the use of LP-gas eliminates the washdown of lubricating film and oil dilution. With these elements of deterioration eliminated, it is natural that a cleaner engine will result, and a resultant substantial reduction in maintenance costs should be experienced."

The net effect of these salutary operating conditions, Perkins said, will be to reduce engine wear and cylinder erosion, increasing the mileage interval between engine overhaul.

Clifford J. Hunt, newly appointed general manager of the Stromberg-Carlson Co.'s Radio-Television Division.

Appointment of John (Jack) W. Hanlon (above) as sales manager of the Carry-All Division of Morrison Steel Products, Inc., Buffalo, N. Y., has been announced by Sam Morrison, president. Before the war he was in charge of sales for the eastern section of the United States for the Carry-All Division.

Mr. Hanlon, who has spent his entire business life in selling, sales promotion, and merchandising, recently resigned as sales manager of Dermetics, Inc., N. Y., to return to Morrison Steel Products, Inc. Previously he was in charge of post-war planning and sales promotion for the Metal & Alloy Specialty Co.

REILLY TAR & CHEMICAL:

Edwards Elected Pres.

CARLETON B. EDWARDS has been elected president of Reilly Tar & Chemical Corp. and Republic Creosoting Co., succeeding Peter C. Reilly who died on Jan. 4. Other officers of the companies are P. C. Reilly Jr., vice president and treasurer: T. E. Reilly, vice president and production manager: and R. J. Wechsler, secretary.

STROMBERG | CARLSON

transmitter

Published by the makers of famous XY Equipment

VOL. 1, NO. 2, MAY 1952

NEVADA'S WONDER CITY GOES XY

One of the newest dial switchboard orders on the books at Stromberg-Carlson is for a 1200 line XY board for installation at Henderson, Nevada's newest and third largest city. This will be the first XY in Nevada.

Only ten years ago the townsite of Henderson was just a few more square miles of the rock and gravel desert that surrounds Las Vegas and makes an ideal spot for the atom bomb testing area that lies to the north of Henderson and Las Vegas.

peak during the war. Over 350 new homes are under construction and at least 400 more will be built this year. Ground has been purchased for a new one million dollar school, new business buildings, banks and stores are planned or being built.

Shortly after the beginning of World War II the tremendous expansion of aircraft production in this country created a shortage of magnesium metal used in many phases of airplane manufacture. To implement the production of this critical material the United States Government built a tremendous plant on the desert about 15 miles from Hoover (Boulder) Dam and a like distance from Las Vegas. To provide housing facilities for workers in the plant, called the Basic Magnesium Project, the town of Henderson was built. The tremendous quantities of cheap hydroelectric power and water from Hoover Dam and the availability of magnesium ore from nearby mines determined the site of the project.

Except for toll stations the townsite of Henderson had no telephone facilities during the war in spite of its population of over 7,000. The plant itself, however, had a very extensive underground cable and conduit system installed by the Government and served by an 1100 line Manual PBX. This switchboard was located in a bomb-proof air-conditioned building adjacent to the plant.

After the war the plant and townsite were sold to the State of Nevada and were administered by the Colorado River Commission, a state board, whose purpose was to attract new industry to Nevada and to sell the facilities of the town and plant to private investors and home-owners.

Hershel Trumbo and William J. Urga had been employed in the project during the war. In 1944, Hershel Trumbo entered the Marine Corps and served in the Pacific Theater. He returned in 1946 and became manager of communications facilities at Henderson. Bill Urga had set up shop for himself as an electrical contractor in Las Vegas.

"In 1949," says Hershel Trumbo, "most people thought that Henderson was going to be another western ghost town. You couldn't have given the place away. But I couldn't see how private industry could afford to stay away once they found us. Low-cost power is too big of an attraction and I was sure Henderson had a real future if we could hold out long enough." It was at this time Trumbo found that the

Aerial View of Henderson, Nevada . . . City of telephones and door chimes.

existing telephone facilities could be purchased from the State by anyone who agreed to provide good service for the town as well. It was too big a job to take on alone and he immediately thought of Bill Urga in Las Vegas.

"Hershel called me one night," Bill relates, "and told me we could buy the Henderson telephone plant. I thought he was kidding. But he wasn't and here we are."

Buying something from the Government takes time. On the strength of a verbal agreement, the two young men began serving the residents and businesses of Henderson. In January of this year when the final papers were ready, the Company was serving 1,100 subscribers.

In the meantime, the chemical industry had found Henderson, too. The big plant pictured above was sold to six nationally known chemical companies. More industries are coming and more new plants will be built.

Today, Henderson is busier than at its

From a telephone plant man's viewpoint Henderson is a "dream town." It's a completely and thoroughly planned town. Everything went down on paper before the first shovel of dirt was turned and all expansion is being done the same way. Another block of desert is surveyed, streets laid out, the number and kind of homes determined. No vacant lots to account for in the cable multiple, all station wiring is done by the building contractor when houses are in the framing stage in return for which the telephone company provides the inside wire for both telephone and door chime. All utilities are provided for in an orderly manner with plenty of advance notice. The entire plant is in cable —no open wire to run up maintenance costs.

As all telephone people know, there's just one catch to that kind of expansion: Money! It was obvious that Henderson should "go dial." Toll center facilities are in Las Vegas and the exchange could be

STROMBERG-CARLSON transmitter

operated on a "CDO" basis. Operator wage savings alone, as most everywhere today, would pay for central office dial equipment in a very few years. Equipment-wise the Henderson Company wanted a dial switchboard to match the community: modern, efficient and most of all capable of growing economically. Stromberg's salesman, R. H. Phelps, and sales engineer, R. F. Fairly, worked closely with the company planning for their future requirements for central office equipment, outside plant and instruments. The original installation of 1200 lines of XY will provide for growth during the conversion period (there are now 700 working lines) and for several years thereafter. A second selector switching arrangement and extra power facilities will provide for all future growth without fundamental changes in the original installation. Superimposed ringing was chosen to provide selective subscriber ringing without changing straight-line ringers in present instruments and to cut labor costs of conversion. All station instrument additions will be of the new Stromberg-Carlson 1400 series telephone. The company will "cut-over" with 2100 stations.

Assisted by Miss June Frick, William Urga and Hershel Trumbo complete plans for conversion to XY.

Seeing is believing, of course, and the owners flew to Carlsbad, New Mexico, the nearest XY installation of a comparable size. Following that trip, Hershel Trumbo wrote to our factory, "The Stromberg-Carlson equipment installed in Carlsbad is a wonderful contribution to the field of communications. We are very pleased that we have had the opportunity to be able to purchase equipment of this type from your company."

And that "old Debbil" money? A three day trip to Henderson by P. J. Lucier, Manager of the Stromberg-Carlson Credit Corp., insured a 22-year loan of $240,000 for the Henderson Telephone Company. Interim funds will be advanced as required. Principal installments will not begin until the third year and the loan will provide for dial equipment, instruments, cable extensions, pole line, all miscellaneous materials and supplies, and a new $25,000 combination office and equipment building.

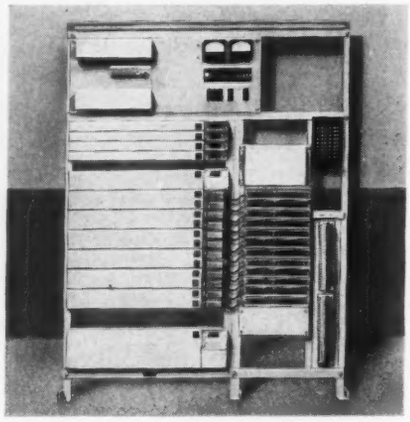
Bill Urga summed it up. "We're really in business. It's almost too good to be true!"

Two New XY Switchboards Added to Line for Small Users

From the laboratories of the Stromberg-Carlson Company now come two new members of the XY Systems family, the F-40 and the F-80 XY PBX Switchboards. With the addition of these, the Company now offers to the industry a well-rounded line of dial private branch switchboards that will care for the requirements of small users, as well as those whose requirements are unlimited. Both new systems incorporate the same basic XY features that have made the XY Community Dial and Main Dial offices so popular with the independent operating industry.

Flexibility and floor space saving, as well as a universal switch that can be used in any switch train position of a Central Office or in any switch train position of an XY PBX installation, are proving a means of reducing maintenance costs and parts inventory for those companies that are interested in an improved earning figure. Many installations of the finder-selector-connector type are now in service and each day brings new orders for this type of system.

The new F-40 PBX is a finder connector system with framework of unit type construction. Bay frame dimensions are 5′6″ high, 3′ 10-⅝″ wide, and 1′ 1-¼″ deep, arranged so the line circuits and finder-connectors are mounted on the front with the trunk shelf being mounted in the rear. The power panel mounts on the front, above the line circuits and the battery and charger can be placed in convenient nearby locations. Since the XY vertical wire bank are dust free, the equipment is usually not enclosed; however, a metal cabinet with full opening doors, front and rear, can be furnished if so desired. The switchboard has a capacity of 40 lines, 6 finder-connectors, 4 Central Office trunks, and 4 information trunks, employs a two digit straight line connector with provisions being made for adding optional features. The dial PBX provides inter-plant service without any assistance from the attendant, using a two digit directory number. Outgoing trunk calls from unrestricted telephones are switched directly through to the Central Office while incoming calls are answered by the switchboard attendant.



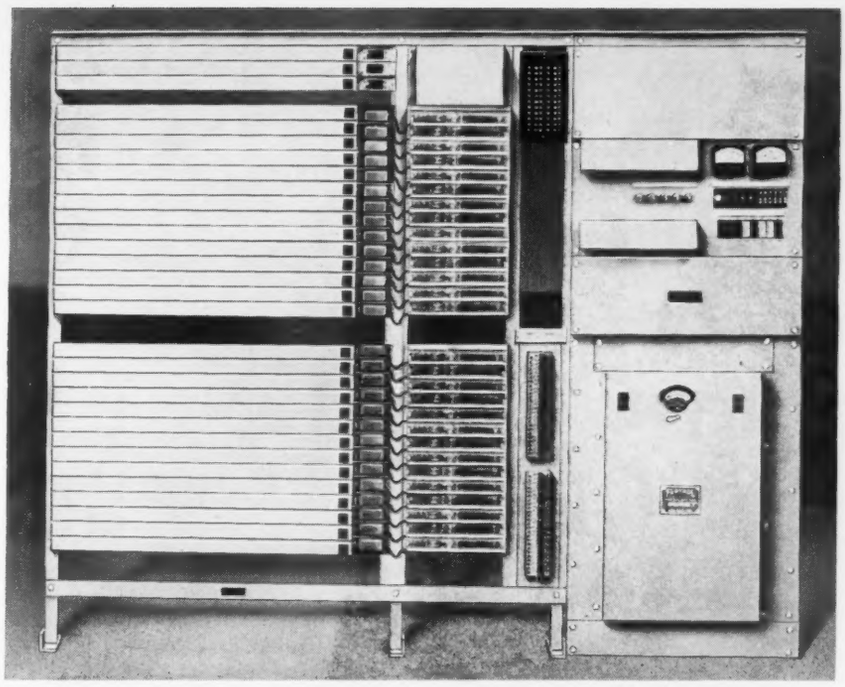
The F-40 XY PBX Switchboard is ideal for the small office or factory. A space saver, it provides an ultimate capacity of 40 lines.

The F-40 usually employs a cordless turret attendant's cabinet of compact design; however, a floor type cabinet can be furnished if required.

The companion system to the F-40 XY PBX is the F-80 System, principally designed for those installations where the basic economies of the finder-connector system can be utilized and the anticipated line requirements will not go beyond an 80 line ultimate capacity. All switchboard equipment is shelf mounted on a single equipment bay, with the over-all dimensions being 6′ 0″ high, 7′ 4″ wide, and 1′ 4″ deep. The finder-connector shelf can be equipped with either a single or dual allotter and the shelf is arranged to mount on the bay. Like the F-40, the trunk shelf is mounted on the rear. In the F-80 System, a separate power bay is used, being attached to the end of the equipment bay, the two together making one integral unit of the same height and general appearance. Batteries can be placed in any nearby convenient location. The attendant's cabinet can be of either cordless turret type or floor type, each having a maximum capacity of 9 two-way Central Office trunks and 4 local information trunks. The F-80 has the same general operating features as the type F-40 and when fully equipped accommodates 80 lines, 14 finder-connectors, 9 Central Office trunks and 4 information trunks. This system employs a two-digit straight line connector with provision for adding code call and certain other optional features; it contains also the usual standard features found in a dial PBX System. Inter-plant connections are established without operator assistance by dialing a two-digit directory number. Unrestricted telephones can switch through directly to the Central Office by dialing a single Central Office trunk digit. Outgoing and incoming calls are handled in the same manner as on the F-40 System.

These operating companies desiring further information concerning the Stromberg-Carlson line of Dial PBX Systems should write Rochester or the nearest branch for a copy of brochure T-111.

STROMBERG-CARLSON **transmitter**



As many as 80 lines, 14 links, 9 Central Office trunks and 4 information trunks can be provided with this F-80 System, for medium sized private branches.

PERSONAL

Golden Jubilee: Welcoming guests to the 50th Anniversary celebration of the Cuming County Independent Telephone Co., Wismer and Beemer, Nebraska, was H. D. Thompson, Manager of the Company. The firm, which began in 1902 with 100 Stromberg-Carlson telephones and a switchboard, now boasts a total of 1511 phones in service.

Welcome: To Mr. and Mrs. Merle Tutty of Tulsa, Okla., who have entered the independent telephone business by purchasing the telephone company in Chouteau, Okla. In the past, the Tuttys owned and operated one of the finest tourist motels in Tulsa.

Founded in March, at Clarksburg, was the West Virginia Independent Telephone Association, representing independents from all over the state. President of the new organization is Gerald H. Parks, of the Duncan Telephone Company, Thomas, W. Va. Carl Ballentine of the Short Line Telephone Company (Pine Grove) and Inland Tel. and Tel. Co. (Middlebourne), is its First Vice-President. Second v.p. is James M. Baer, Pocahantas Telephone Company, of Marlinton. Secretary-Treasurer is J. W. Null, of the Wayne Telephone Company, Wayne.

More Construction: Now that the Fegan brothers, Tom and Bob, owners of the Junction City Telephone Company, Junction City, Kansas, have started the new building to house their XY dial equipment, other building projects being started are new homes for each of their families. It is assumed that this construction will be supervised by the wives.

Ready to Go: Earl McDonald, owner and manager of the Ackerman Telephone Company, Ackerman, Miss., has completed his central office building, which will house 200-line XY dial equipment, to be cut into service this summer.

Congratulations: To Donald Lamb, formerly district manager at Athens for the Gulf States Telephone Company, who has been promoted to the Company's general offices in Tyler, Tex. He is succeeded at Athens by Grady Shirrey, who had been manager of the company's branch at Kaufman.

Add to the Stork Parade: Mr. and Mrs. Allyn Lawson, of the Southern Nevada Telephone Company, Las Vegas, became the proud parents of a bouncing baby girl, on March 20.

Meet *T. C. Thompson*

Learning the business "from the ground up" is literally the truth in the case of Stromberg-Carlson's Telephone Sales Manager, T. C. Thompson, who began his career as an installer in 1919. The first five years were spent with the Illinois Bell Company and the former Citizens Independent Telephone Company of Terre Haute, Indiana. For 28 years, his service with the Stromberg-Carlson Company has been continuous.

In 1929, "Tommy" joined the sales force, covering first Ohio, later Nebraska and Texas territory, working out of the Kansas City office. During the war years he became branch manager for the Pacific Coast. This San Francisco office consisted of only one other salesman and between the two, they managed to cover the entire western territory which was no ordinary assignment. In 1945 he was recalled to Rochester as sales manager of the telephone division. In his present position he has full charge of the sales operations of five telephone branch offices.

A firm believer in the power of personal contact in selling, he enjoys meeting the challenge of competition. Probably the most positive proof of his success as a sales manager lies in the fact that in a few years the XY system has become known from coast to coast and accepted by the Independent telephone industry. This tremendous acclaim has come in the short span of 6 years and is eloquent testimony to the concentrated selling job that was required. Last year alone, Thompson attended sixteen state conventions.

A lover of home and family, "Tommy" is the father of two girls, Dorothy and Pat who are both married.

Stromberg-Carlson is fortunate in having for its sales manager a man who has the qualities of thorough technical knowledge and competent executive ability. Either one of these characteristics is recommendation enough but in T. C. Thompson they are combined. This is only one of the many reasons why he is one of the best known and best liked telephone sales managers in the United States today.

STROMBERG-CARLSON transmitter

WELCOME TO NEW XY TOWNS IN ARKANSAS AND ALABAMA

Smackover, Ark. Cuts In XY System

A 460-line XY Central Office Installation was cut into service for the Union Telephone Company, at Smackover, Ark., on January 5.

Pictured below are John W. Carter, Manager of the Telephone Company, and Paul Murnaghan, of Stromberg-Carlson. Approximately 75 local and out-of-town guests were present for the cut-over in the new building, which also houses the executive offices of the Company.

The first call was placed by Mayor J. C. de Yampert, who called the Arkansas Democrat in Little Rock to report the completion of the Smackover change to dial service.

Both the administrative offices and XY equipment are housed in this modern new building at Smackover, Ark.

Roanoke, Ala. Cut-Over to XY Marks Firm's 50th Anniversary

Mrs. Ethel Cauthen, owner, puts through Roanoke Telephone Company's last manual call.

On February 2nd at Roanoke, Alabama, Mrs. Ethel Cauthen made the last operator-placed call on the old switchboard (to her sister, Mrs. Bessie Schuessler) when the new 600-Line XY system was cut into service. The cut-over was supervised by Mr. Herbert Cauthen, Manager, assisted by his four brothers, and Mayor K. L. Hooper placed the first dial call to Mr. C. L. Owen, President of the Alabama Public Service Commission in Montgomery.

This conversion to dial service at Roanoke is something of a 50th Anniversary event. It was in 1902 that the late H. H. Cauthen with Mrs. Cauthen purchased the telephone system then in operation with 83 telephones. Today's system serves approximately 1000 subscribers. This latest development is the culmination of a long struggle by Mrs. Cauthen, who due to the death of her husband a number of years ago was left with the responsibility of operating the telephone company and raising five small sons, all of whom she gave a college education.

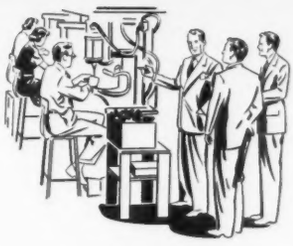
Plant Manager Herbert Cauthen states that the company also has embarked on a program which will provide a new cable system for the entire city. When this work is completed, the Roanoke Telephone Company will have in operation a new system inside and out.

Four of the five Cauthen brothers team up to assist in dial cut-in. Front to rear, they are: Frank, Sgt. "Peck", Dr. George, and Joe.

OTHER NEW XY INSTALLATIONS

Millstadt, Ill.	350 lines
Dunedin, Fla.	850 lines
Lenah, Va.	90 lines
Beecher City, Ill.	120 lines
Boise City, Okla.	400 lines

STROMBERG-CARLSON transmitter



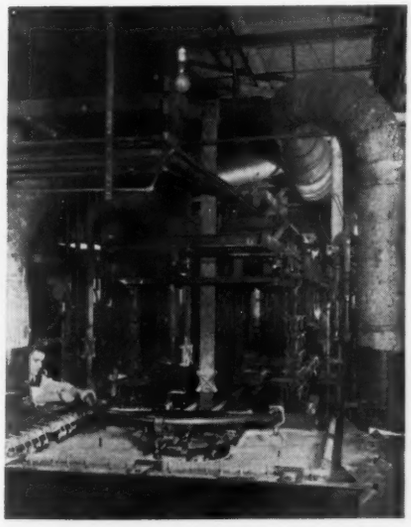
FACTORY TRIP

EDITOR'S NOTE: This is the second in a series of "plant tours" in print, to show production techniques of general interest. We hope that at some time every independent telephone operator will be able to visit us at our Rochester plant in person. In the meantime, suggestions from readers for topics to be covered will be welcome.

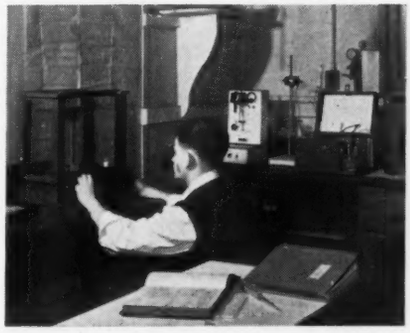
Quality Plating Protects Your Investment In Equipment

The old adage "Save the surface and you save all," as employed by the paint industry, is just as true when applied to the multitude of metal parts used in Stromberg-Carlson telephone equipment. Operating companies must always consider the safety of their investment and one of their chief concerns is the damage which could be caused by corrosion.

Quality is the byword in plating, as in other phases of the engineering and production of Stromberg-Carlson telephone equipment. From the design engineer through the final inspection, careful attention is given to the plated finishes and allied chemical treatments to assure that they will provide the characteristics necessary for satisfactory long life operation.



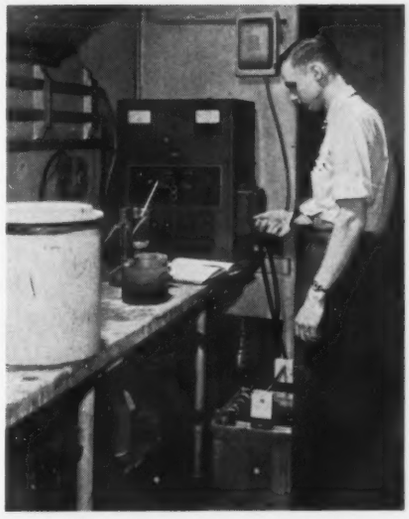
Unplated parts are loaded on this machine, and automatically cleaned and plated. Machine returns them to loading point ready for assembly.



In this control laboratory, a trained chemist performs daily analysis of plating solutions.

The story of plating at Stromberg-Carlson begins, you might say, with stringent specifications. These specifications are in accord with American Society for Testings Materials and government specifications. They provide the design and production engineer, production personnel, and the inspection department with information as to the performance characteristics, general uses, process, specific requirements, and methods of testing a particular finish.

As new finishes, new methods or new materials are made available to the metal finishing trade, these are investigated and evaluated by the Materials Engineering Department's plating development and testing section. Advantage is taken of the results of research at the National Bureau of Standards, from projects at leading universities under the direction of the American Electroplaters Society, at Batelle Memorial Institute, and similar sources. When improvements appear likely, they are thoroughly tested with respect to corrosion resistance, mechanical wear, electrical conductivity and magnetic properties. Then, if necessary, new specifications are drawn up or current ones revised.



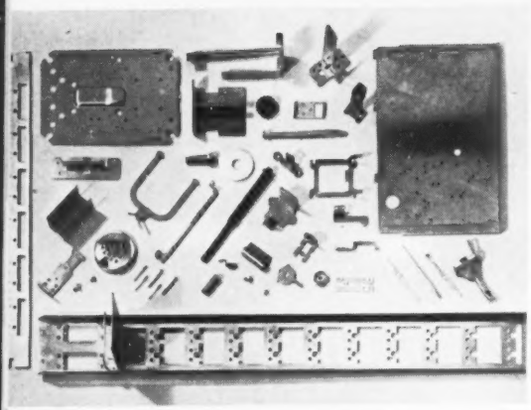
New plating processes are investigated and developed in the plating development laboratory, a part of the Materials Engineering Department.

Close liaison is maintained between the Materials Engineering Department and the Production Engineering Department to assure that improvements are carried through pilot operation and into production with no difficulty. Production foremen and personnel are acquainted with the process or material in detail and instructed in its operation and use.

Abrasive stones, with which parts are revolved in this special barrel, remove burrs, sharp edges, and scale.

As all telephone men well know, there are literally hundreds of plated parts used in making telephone equipment. This requires a variety of plating equipment and experienced platers, plus adequate control of plating solutions. Equipment in the Stromberg-Carlson plating department

STROMBERG-CARLSON transmitter



These are typical examples of the many plated parts used in Stromberg-Carlson telephone equipment.

ranges from a small tank for gold plating to a fully automatic machine for zinc plating. Automatic devices control plating times and solution temperatures.

In any plating process, the preparation of the metal parts before actual plating is fully as important as the plating itself. The first operation is to remove grease and oil with solvents or soaps. After this, some parts are tumbled in specially designed barrels with stones of selected size and hardness or other abrasive materials. This process removes the sharp edges, burrs, and heat-treating scales. A further step is acid pickling to remove surface oxides. For those parts requiring an extra smooth or shiny surface, a polishing or buffing treatment is added to the process.

Zinc is used as the plating material on most parts when soldering is not a factor and a polished surface is not required. After zinc plating, parts are further treated as an added insurance against corrosion. The results of this technique—largely the result of wartime development—can be seen immediately in the "golden glow" which it gives to the treated parts. Metal pieces used directly in soldering connections are solder-plated.

The plating department at Stromberg-Carlson has its own control laboratory where a trained chemist analyzes the cleaning solutions, acids, and plating solutions daily.

All of these measures: engineering specifications, process specifications, preparatory steps, plating, analysis and final inspection, insure uniformity and quality of finish, which add years to the life of your telephone investment.

Flexibility, Convenience Make Multiple Line Key Turrets Easy to Sell

Mr. Justin Williams, Service Manager of the Rochester Telephone Corporation, was recently asked to explain the reason for the large number of Stromberg-Carlson multiple line key turrets the Telephone Company has in service.

Mr. Williams was high in his praise of these systems, saying they had many different applications that resulted in satisfied customers, and provided a high source of revenue to his Company. He continued:

"We have found that almost any type business that required several people to handle incoming calls find the multiple key turrets valuable to save time and give better service. Department stores, large groceries, gas and electric service departments, insurance companies, railway ticket offices, banks, and many others are subscribers for this type service.

The flexibility of the multiple key turret is important in banks, as shown here, where calls are quickly handled and efficient service provided.

"We have also found it valuable for offices that wish to have one or more persons with turrets intercept incoming calls to individual parties that are not answered within a reasonable time.

"There are many places that do not feel that a regular PBX with a full-time operator is necessary. The multiple key turrets apply very well to these cases, as they provide answering facilities at each turret to divide the time between several people and make a regular operator unnecessary."

Some idea of the popularity of these systems with the Rochester Telephone Corporation is evident from the number of systems and turrets in service. At the present time there are 235 systems with 1057 turrets in use in the Rochester area.

Mr. Williams emphasized the revenue obtained from these systems. The monthly revenue of an average installation of six lines with six turrets is $26.40 plus the regular extension station charges.

This airline ticket office, where incoming calls are handled by several attendants, was a "natural" for a multiple line key turret.

To summarize the advantages and flexibility of the multiple line key turret systems, the following points are emphasized:

1. ***Flexibility***—The turrets are built in units of three line sections so that they may be equipped with three, six, or nine lines by adding to the original section and base.

   The relay cabinet is also wired for the full complement of nine lines.
2. ***Signals***—Incoming and busy or hold lamps are provided in each turret. These lamps are multiplied to indicate when a line is in use to prevent going in on that line when making an outgoing call.
3. Each turret may be equipped with a selective ringing common talking circuit for signaling and talking to other turrets.

   A common pilot is installed in each turret that lights at all turrets to indicate the common talking circuit is in use. This feature is also valuable when turrets are used for intercept service.
4. A night alarm buzzer under control of a key is installed in each turret for audible signal.
5. A regular operator's jack is installed in the turret so that the attendant can use either a handset or operator's set. The system is arranged for operation with either common battery manual or dial central offices.

INDEX OF ADVERTISING

Acme Equipment Co. —
Acorn Insulated Wire Co. 77
Allied Chemical & Dye Corp. Barrett Division 2
Alphaduct Wire & Cable Co. 83
American Electrical Heater Co. —
American Steel & Wire Co. 61
American Structural Products Co. 96
American Tel. & Tel. Co. 58-59
Ansonia Electrical Co. —
Armstrong Cork Co. 79
Automatic Electric Sales Corp. 28, 54, 55, 97
Automatic Electric of Canada —
Automatic Telephone & Electric Co., Ltd. —

Bartlett Mfg. Co. 91
Bartlett Tree Expert Co., F. A. —
Bashlin Co., W. M. 72
Berry & Co., L. M. 85
Bernz, Otto —
Bethlehem Steel Corp. —
Bishop Manufacturing Corp. —
Blaker, A. W. —
Buckeye Telephone & Supply Co. 30, 90
Buckingham Mfg. Co. —

Cable Spinning Equipment Co. 60
Calculagraph Co., Inc. 81
Chanaberry Engineering Co. 78
Chance Co., A. B. —
Chapman Chemical Co. 49
Chase Brass & Copper Co. —
Chisholm-Ryder Co., Inc. —
Churchill Cabinet —
Cleveland Trencher Co. —
Coffing Hoist Co. 69
Coleman Wire & Cable —
Colfax Lumber Creosoting Co., Inc. —
Commercial Cord & Supply Co. 84
Communi-Catering 73
Cook Electric Co. 48
Copperweld Steel Co. 29
Corey Steel Co. 73
Crane, Carl C., Inc. 73
Cullom & Ghertner Co. 90

Daubendiek, C. H. 73
Davis Construction Co. 73
Dillon & Co., Inc., W. C. —
Donnelly & Sons, R. R. 105
Du Pont De Nemours Co., E. I. 27

Electric Products Co., The —
Electric Storage Battery Co. 3
Ericsson Telephone Sales Corp. 98

Federal Tel. & Radio Corp. 32

General Cable Corp. 20-21
General Insulated Wire Works, Inc. 78
General Scientific Equip. Co. 30
General Telephone Directory Co. 108
Gould National Batteries, Inc. 5
Graybar Electric Co. 17
Greenlee Tool Co. —

Haley Co., Inc., R. G. —
Harris-McBurney Co. 73
Henkels & McCoy 73
Henning Electric Motor Co. —
Highway Trailer Co. 64
Hill, Cyrus G. 73
Homelite Corp. —
Hubbard & Co. —

Independent Telephone Repair Co. 91
Indiana Steel & Wire Co. 84
Insto-Gas Corp. 96
International Harvester 23
International Standard Electric Corp. 33

Jaeger Machine Corp. —
Johnson's Fair —

Ka-Mo Tools, Inc. —
Kaufman Co., H. J. —
Kearney Corp., Jas. R. 77
Kellogg Switchboard & Supply Co. 6, 7, 8, 9
King, W. T. 73
Klein & Sons, Mathias 80
Koppers Co. 63

Leich Sales Corp. 50-51
Lenz Electric Mfg. Co. —
Lindsay Telephone Supply Co. 84
Line Equipment Co. —
Line Material Co.—a McGraw Electric Co. Div. —
Loomis Advertising Co. —
Lorain Products Corp. 67
Lowell Insulated Wire 79

MacGillis & Gibbs Co., The 73
Mahood Edwin T. 73
McCabe Powers Auto Body Co. 31
Midwest Utility Co. 73
Miracle Adhesives Corp. —
Mitchell, Jay G. 73
Moran, John J. 73
Morrison Steel Products, Inc. —
Murer and Smith 73
Moss, T. J., Tie Co. —
Mutual Liquid Gas Equip. Co. —

National Carbon Co. —
National Fireproofing Co. 80
National Telephone Supply Co. 107
Neale Construction Co. —
Neale, D. J. 73
North Electric Mfg. Co. 10

Oliver Iron & Steel Corp. —
Onan & Sons, Inc., D. W. 88
Owens-Illinois Glass Co. —
Overton Co., S. E. —

Packer, John W. —
Page & Hill, Inc. 88
Paragon Electric Co. —
Patterson & Dewar 73
Peterson Engineering —
Porcelain Products, Inc. —
Porter, H. K. —
Power Equipment Co. 89
Premax Products, Inc. 105
Pruzan Co., Jack —

Ray-O-Vac Co. —
Raytheon Mfg. Co. 52
Rebuilt Electrical Equipment Co. —
Reilly Tar & Chemical —
Reliable Electric Co. 34
Republic Creosoting Co. —
Remington Rand —
Roll-A-Reel 80
Runzel Cord & Wire Co. 74
Ryan, F. B. —

Schauer Mfg. Co. 66
Sentinel Company, The 73
Seymour Smith & Son, Inc. —
Sherron Metallic Corp. —
Sloan, Cook & Lowe 73
Southern Electric Transmission Co. —
Southern Engineering —
Stahl Metal Products —
Standard Art Code —
Stromberg-Carlson Co. 36, 37, 70, 71, 86, 87, 94, 95, 99-104
Sugarman Equipment Co. —
Suttle Equipment Co. 75

Taylor-Colquitt Co. 30
Tel-E-Lect Products, Inc. —
Telephone Advertising Inst. —
Telephone Answering & Recording Corp. —
Telefon Fabrik Automatic A/S —
Telephone Engineer Pub. Corp. —
Telephone Power & Supply Co. 57
Telephone Repair & Supply Co. 91
Telephone Shop —
Tele-Wire Supply Co., Inc. —
Telkor, Inc. —
Termite Drill Co. —
Texas Creosoting Co. —
Thompson Chemicals Corp. 13
Tilden Tool Co. —
Trowbridge Construction Co. 79

Unique Mfg. Co. —
U. S. Independent Tel. Assoc. —
U. S. Steel Corp. American Steel & Wire Div. 61
U. S. Steel, Coal Chem. Div. 24-25
Utica Drop Forge & Tool Corp. 16
Van Dine, Joe C. —
Vannort, B. O. 73
Vulcan Electric Co. —

Wall Mfg. Co. —
Western Electric Co. 65
Williams, Geo. E. 90
Wilton Electric & Telephone Construction Co. —
Whitney Blake Co. —
Wooten & Co., L. E. —
Wyoming Valley Equipment Co. —

York-Hoover Corp. (Body Div.) —

TELEPHONE DIRECTORY PRINTING

THE LAKESIDE PRESS

R. R. DONNELLEY & SONS COMPANY

350 EAST TWENTY-SECOND STREET
CHICAGO 16, ILLINOIS

Printers · Binders · Engravers · Lithographers

PREMAX

Always Legible

Property Marking

Public Utilities of all types are adopting the Premax method of using stamped and embossed metal letters, figures and tags for property identification. The first cost is lowest and there are no upkeep charges as the Premax Markers outlast the average pole.

Send for details

PREMAX PRODUCTS
DIVISION CHISHOLM-RYDER CO., INC.
5245 Highland Ave. Niagara Falls, N. Y.

Plan Now To Attend Your Association's Annual Convention

Plan Now To Attend Your Association's Annual Convention

THE BACK OF THE BOOK

By JOHN G. REYNOLDS, Managing Editor

"Taking Our Shirts . . ."

LATE IN FEBRUARY a shirts-for-Congressmen campaign was started in California. The originator of the idea was a State Farm Bureau official, who told an audience, "To my Congressman, I say: 'You are taking now in taxes everything but my shirt. You might as well have that, too.'" He then yanked off his shirt, and a number of others followed suit. The campaign was enlivened by a woman who sent her Congressman a girdle, with a note suggesting a little more "figure control" by Congress.

It isn't likely this campaign will go far—after the tax collector gets through with the average citizen he has to make his shirts do double-duty and he can't afford to throw one away. But it is a significant sidelight on the most menacing domestic problem the country faces. Last March, we paid the biggest tax bill in our history. Banks and other agencies reported that borrowings to pay taxes were extraordinarily large—and they were made by people who needed a hundred or so, no less than from high-income taxpayers who found themselves short by thousands. Even so, this tax bill wasn't as large as the Administration wanted.

Taxes now take some 30 per cent of the entire national income. That simply means we work almost four months of the year to pay the cost of government. Is it any wonder that taxes are undermining incentive, discouraging the investment of capital, and making it next-to-impossible for a man to accumulate substantial savings? Taxes are taking our shirts—and taking the heart out of the country.

• • •

Home Is The President

NOW THAT THE $7 million remodeling of the White House is completed, it's sort of interesting to see how the job came out.

Running the place will cost $337,000 a year, about $4,000 more than was spent in building it originally. It takes some 72 people just to handle White House chores, even with the many new kinds of gadgetry that have been installed as a part of the remodeling. Everyone of the rooms has individually controlled air conditioning, a telephone, TV and radio outlets, intercommunications arrangements and other electronic marvels of the day. There are 19 baths and 12 lavatories.

Among the White House's 107 rooms are a movie theatre, a broadcasting studio, a swimming pool, doctors and dentist's offices, a 28-foot deep basement, a two-story kitchen ready to cook for a thousand people.

In other words, all the comforts of home.

• • •

Best Answer . . .

HAVE SOCIALISTIC governments solved the problems of their people?

The best answer is the following advertisement by Warner and Swasey, manufacturers of machine tools, Cleveland, Ohio. The advertisement was headed "Pathway to Poverty," and it said: "Last month, in London, one of this Company's officials asked an English manufacturer, noted as a liberal, this question: What could England have done to prevent its present bankruptcy? Here is his answer:

'For the past 50 years we should have been investing more money in better machines. We taxed away profits that should have been left in the business to modernize it. Now, with the old equipment, we can't compete. Our workmen can't produce enough to earn a living, our costs are too high to let us compete. If I were an American business man I'd keep putting every dollar I could get into the most modern machinery on the market. If I were an American politician I'd promote laws that foster such investment. If I were an American worker, I'd use those machines to produce at lowest possible cost. It takes all three working together to keep a country sound and solvent. We failed to work that way here; now all three of us are bankrupt.'

"Then, too, two countries—New Zealand and Australia—tried socialistic forms of government immediately following the war, and in recent elections, both have gone back to the free enterprise system."

Nicotap

THE FAST, DEPENDABLE Nicopress WAY OF MAKING LINE AND DROP WIRE TAPS

THE NICOTAP IS SPLIT

THERE IS NO NEED OF CUTTING THE LINE TO MAKE THE CONNECTION—JUST SLIP THE SLEEVE OVER THE LINE WIRE AND COMPRESS

12 BWG TO 12 BWG
Stock No. T2-109D

12 BWG TO No. 17-18 DROP WIRE
Stock No. T2-109 x 045D

17-18 B&S TO 17-18 B&S
Stock No. T2-045B

Manufactured in many different sizes and combinations

The National Telephone Supply Company

5100 SUPERIOR AVENUE • CLEVELAND 3, OHIO

Canadian Mfr.—N. SLATER CO., LTD., HAMILTON, ONT., CANADA

Export Distributor—INTERNATIONAL STANDARD ELECTRIC CORP., NEW YORK, N. Y.

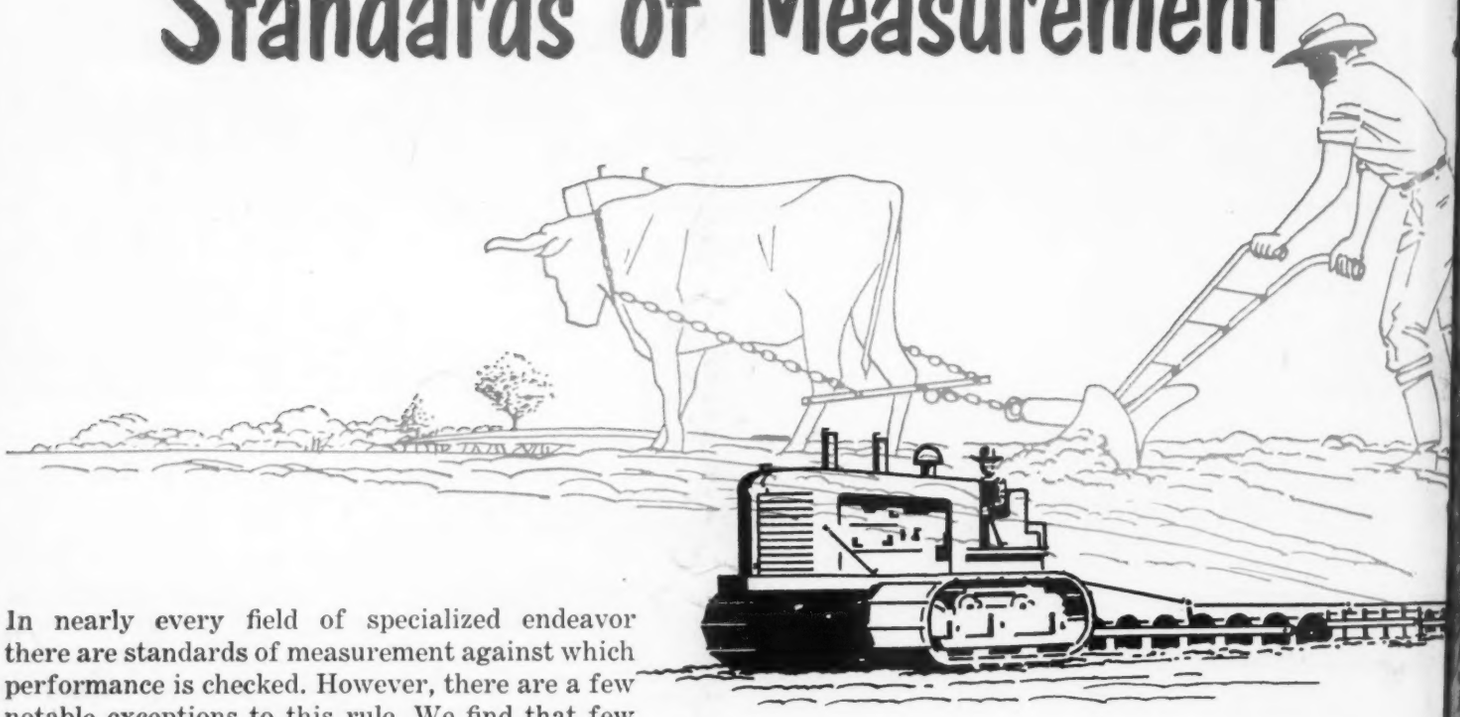
Nicopress is the Registered Trade Mark of The National Telephone Supply Company

THE NATIONAL TELEPHONE SUPPLY COMPANY

ASK YOUR JOBBER

An acre was originally defined as the amount of land that one man with one ox could turn in one day. Then the industrial revolution brought us mechanized farming and the origin of the acre lost its significance. In this case, as in many others, technical and technological improvements tend to make us alter our concepts. In spite of this fact it is still true that performance can be checked and progress can be recorded only by comparison with accepted . . .

Standards of Measurement



In nearly every field of specialized endeavor there are standards of measurement against which performance is checked. However, there are a few notable exceptions to this rule. We find that few Independent Telephone Companies have ever applied a proven standard of measurement to their directories.

LET US ASK YOU JUST ONE QUESTION

Did you measure the results of your current directory by simply comparing it with your previous issue? Unfortunately, most telephone companies are still following such a procedure.

We publish directories that serve more than 4,000 Independent Telephone Exchanges. From our records we have been able to establish standards of measurement, such as; directory revenue per station, directory revenue per business account, directory revenue per advertiser and advertisers per one hundred business accounts.

These established measurements of results, when applied to your current directory, will show you whether your current directory job was good or bad, and whether or not we could do a better job for you by increasing your net directory profits.

Why don't you send us a copy of your current directory and let us make a study of it without any obligation whatsoever?

You have everything to gain and nothing to lose!

GENERAL **TELEPHONE DIRECTORY COMPANY**

Telephone collect or wire to the nearest office below.
Our representative will call at your convenience.

N. 108 Washington	1415 Avenue M	185 North Wabash Avenue	604 Pine Avenue
Spokane, Washington	Lubbock, Texas	Chicago, Illinois	Long Beach, California
Telephone MAdison 8644	Telephone 2-6330	Telephone STate 2-5478	Telephone 6-7221

Publishers of Telephone Directories throughout the United States and the Territory of Alaska.